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CONTENTS

A CRÈCHE OF ROCKHOPPER PENGUINS, Photograph by *Olin Sewall Pettingill, Jr.* ..... facing page 213

CRÈCHE BEHAVIOR AND INDIVIDUAL RECOGNITION IN A COLONY OF ROCKHOPPER PENGUINS ..... *Olin Sewall Pettingill, Jr.* 213

A POPULATION STUDY OF THE SPARROW HAWK IN EAST-CENTRAL ILLINOIS ..... *James Harris Enderson* 222

MEASUREMENT OF SOME LAKE-SHORE TERRITORIES OF THE SONG SPARROW ..... *Roderick A. Suthers* 232

SEASONAL CHANGES IN WOOD DUCK ROOSTING FLIGHT HABITS *Elwood M. Martin and Arnold O. Haugen* 238

LAYSAN TEAL IN CAPTIVITY ..... *S. Dillon Ripley* 244

HEART WEIGHTS OF NORTH AMERICAN CROWS AND RAVENS *David W. Johnston and Francis S. L. Williamson* 248

EVALUATION OF AN AURAL RECORD OF NOCTURNAL MIGRATION *Richard R. Graber and William W. Cochran* 253

THE CAROLINA PARAKEET IN PIONEER MISSOURI ..... *Daniel McKinley* 274

GENERAL NOTES

NESTS OF LESSER SWALLOW-TAILED SWIFT IN MÉXICO ..... *Lovie M. Whitaker* 288
ROSS GOOSE TAKEN AT HORSESHOE LAKE, ILLINOIS ..... *Glen Smart* 288
COMMENT ON THE FLIGHT DISTANCE OF THE GREAT BLUE HERON ..... *Wm. H. Longley* 289
ADDITIONAL NOTES ON THE SINGING HEIGHT OF OVENBIRDS ..... *Jeff Swinebroad* 289
COURTING DANCE OF THE WHIP-POOR-WILL ..... *Margaret F. Fuller* 290
BLACK VULTURE EXTENDS BREEDING RANGE NORTHWARD *Marie Greider and Elizabeth Sidwell Wagner* 291

ORNITHOLOGICAL NEWS 292

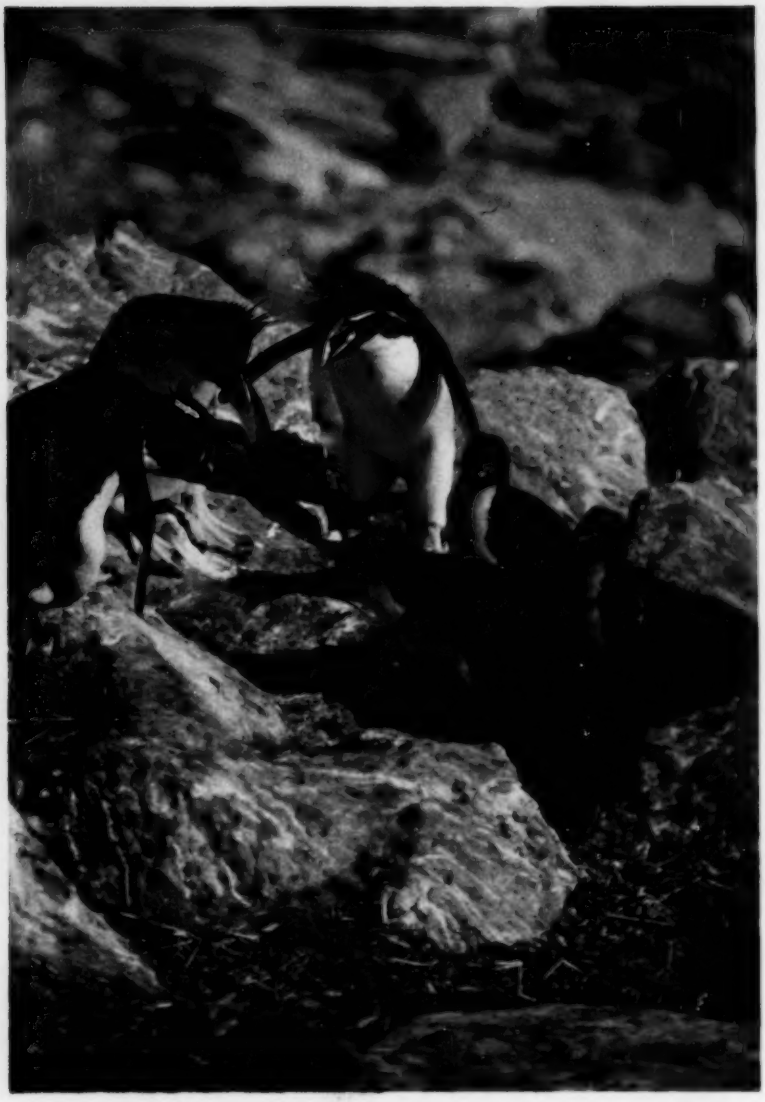
JOSSELYN VAN TYNE MEMORIAL LIBRARY 292

ORNITHOLOGICAL LITERATURE 293

Henry Hill Collins, Jr., *Bent's Life Histories of North American Birds*, reviewed by Phillips B. Street; Letter to Review Editor about his review of Henry Hill Collins, Jr., *Complete Field Guide to American Wildlife*; Fredric Sweny, *The Techniques of Drawing and Painting Wildlife*, reviewed by W. J. Breckenridge; J. D. Macdonald, *Instructions to Young Ornithologists: Bird Biology*, reviewed by Oscar M. Root; John Kieran, *A Natural History of New York City*, reviewed by Olin Sewall Pettingill, Jr.

PROCEEDINGS OF THE FORTY-FIRST ANNUAL MEETING ..... *Aaron M. Bagg* 299

THE WILSON ORNITHOLOGICAL SOCIETY MEMBERSHIP ROLL 308



A CRÈCHE OF ROCKHOPPER PENGUINS

The chicks are about 24 days old. Three "guards" are in the immediate vicinity. Photographed at New Island in the Falkland Islands, January 22, 1954, by Olin Sewall Pettingill, Jr., and published with the permission of Walt Disney Productions.

CRÈCHE BEHAVIOR AND INDIVIDUAL RECOGNITION IN A COLONY OF ROCKHOPPER PENGUINS

BY OLIN SEWALL PETTINGILL, JR.

CHICKS of several species of colonial-nesting penguins customarily leave their nests and huddle in groups. Earlier observers of this behavior concluded that the chicks were actually coaxed or driven into these formations by their parents, a few of which took up stations close by as "guards" or "nurses" to protect the groups from molestation. The groups were consequently called "nurseries" or "crèches." Along with the belief that the crèches were formed and guarded by the adults was the notion that individual parent–offspring attachments disappeared. Adults thereafter fed chicks communally regardless of family relationships, and the ability of parents to recognize their offspring as individuals, and *vice versa*, virtually ceased, if it had existed at all.

True crèche behavior has long been known to occur in four colonial-nesting penguins—the Emperor (*Aptenodytes forsteri*) and Adélie (*Pygoscelis adeliae*), which are strictly Antarctic in distribution, and the King (*Aptenodytes patagonica*) and Gentoo (*Pygoscelis papua*). But crèche behavior in these species is by no means uniform. All chicks in a colony of King Penguins may mass together in one crèche (Roberts, 1940:223–224), as do chicks in a colony of Emperors (Stonehouse, 1953:20). On the other hand, chicks in colonies of Gentoos and Adélies have been reported by a number of observers to bunch up in more than one crèche per colony. According to Richdale (1951:270), a crèche of either species may contain approximately 20 to 30 individuals, although Sladen (1958:59) noted that a crèche of Adélies may be comprised of 100 or more chicks.

Opinions vary with respect to parent–offspring attachments, once the chicks congregate in crèches. Most observers have contended that chicks are fed more or less communally. Levick (1914:96–97) states, for example, that the individual care of Adélie chicks by their parents is abandoned; the adults provide food for the particular crèches in which their young have gathered and "remain faithful" to these crèches "for the rest of the season." The so-called guards around the crèches were, he presumed, the parents of chicks in them. Like most other observers he considered it impossible for adults to recognize their chicks. Recently Sladen (1958:61), by marking both adults and chicks of Adélie Penguins, determined that Adélie adults continue to recognize and feed their own individual chicks at crèche age and that the supposed guards are actually "unsuccessful breeders" and "non-breeders." On the basis of what he has learned from marked birds, it would appear that the earlier observers have overlooked the prevalence of parent–offspring attachments and misinterpreted the status of the guards.

In a visit to the Falkland Islands in 1915–16, Rollo H. Beck (quoted by Murphy, 1936:424) observed that chicks of the Rockhopper Penguin (*Eudyptes crestatus*), which has colonies in many isolated parts of the archipelago, leave their nests when about two-thirds grown and gather in bands of a dozen to 20 individuals. Richdale (1951:270–271) has suggested that Beck's findings may not indicate a true crèche formation, but a behavior comparable to that in the noncolonial Yellow-eyed Penguin (*Megadyptes antipodes*), a species which he has studied extensively by marked individuals. Richdale found that a dozen or so Yellow-eyed chicks may gather in a group along a path that leads from their nests to the sea. This is not a crèche, he believes, but merely a coming together of chicks out of a "penchant for company." An adult may be with them "for the same reason" although "it need not necessarily be a parent of one of the chicks."

The Rockhopper Penguin Colony

When Mrs. Pettingill and I arrived in the Falklands in October, 1953, to film penguins and other wildlife for Walt Disney Productions, we hoped to follow up Beck's observations on the Rockhopper Penguin by marking a few adults and their young and then following their behavior from day to day. The opportunity came when we established our base for four and a half weeks (December 29, 1953 to January 30, 1954) on New Island and were within easy walking distance of a huge seabird colony that contained, by our rough estimation, 20,000 breeding pairs of the Rockhopper Penguin. At Kidney Island, where there was a smaller aggregation, we had a chance to make a few additional observations before and after our stay on New Island.

The New Island colony extended over the upper slopes of several rock-strewn bluffs, 200 to 300 feet above the sea. Because the bluffs were separated by intervening crags and crevices, the colony was discontinuous, being comprised of several sections, one to each bluff. Between the colony and the sea were perpendicular cliffs, cutting off access to the colony except through two steep ravines. The entire penguin population consequently climbed through these ravines on well-worn paths until, above the cliffs, it spread out on many paths to the different bluffs where the nests were located.

When we first visited the colony on December 29, about 80 per cent of the nests contained chicks of ages ranging from the day of hatching to about one week; 10 per cent contained chicks somewhat older; the remainder held eggs. All the nests were being attended by at least one adult. We noted that the ages of the chicks in any one section of the colony were usually the same, but that there was a considerable difference in ages among the sections. Apparently nesting in some sections of the colony had started earlier than in others.

Of the few nests with eggs, about 70 per cent held one egg only; the others held no more than two eggs. We occasionally noticed a nest with as many as two chicks, but we were never certain whether two chicks in a nest belonged to the same parents, or whether one chick had come from a neighboring nest, perhaps prompted by our having disturbed the *status quo*. Gwynn (1953:4) believed it a very rare occurrence for a pair of Rockhoppers to rear two chicks and observed no such instance himself.

Throughout the daylight hours at New Island adult Rockhopper Penguins moved up and down the paths between the sea and the colony, but toward evening there was a noticeable increase in the number of birds coming up to the colony. As each bird arrived at the nest, it was joined by its waiting mate in a mutually performed display, or "greeting ceremony," accompanied by raucous vocal sounds.

Methods of Study

We were easily able to identify the sexes of nesting Rockhoppers by the bill, which, as Murphy (1936:418) has pointed out, is longer, higher, and wider in the male. The difference in the over-all bill size was so evident that it was possible for us, after a little experience, to determine the sex of one bird without another bird of the opposite sex present for comparison.

On January 4 we selected for special study 10 nests that were near together on the edge of a section of the New Island colony farthest inland from the sea. We marked one nest X and the others 0 through 8. Nine of the nests contained one chick each; the other (Nest 3) held one egg. All the chicks were uniform in size and estimated by us to be six days old. Each chick was being brooded by a male; the egg in Nest 3 was being incubated by a female. We marked all the chicks and adult males present by painting on their backs large bright yellow marks corresponding to those given their nests, and the female with red. The paint we used was Testors Dope, a commercial product which dries quickly and holds fast for at least two weeks.

Chronology of Observations

In the period from January 5 through 15 we made 12 visits to the 10 selected nests in order to note the position of the chicks and parents with respect to their nests and to one another, and to make observations on activities and behavior. An abridged account of our observations, obtained after arriving at the nests, follows:

January 5, mid-morning: All chicks being brooded by the same correspondingly marked males. A female close to the male on Nest X. *Late afternoon* (about an hour before sundown): All chicks being brooded by same males. No female in evidence near Nest X, but Nests 2, 4, 7, and 8 each has a female standing beside it. These four birds were caught and their backs marked in red with the numbers of their nests.

January 7, late afternoon: All chicks being brooded by same males; no females present.

January 8, late afternoon: All chicks being brooded by same males. The only female present is Female 8 beside Nest 8. She has evidently just returned from the sea as she is very clean and glossy.

January 9, late afternoon: All chicks being brooded by same males. The only female present is beside Nest 6. She was caught and marked with the number of the nest.

January 10, late afternoon: Chicks X, 0, 1, 2, 4, 5, and 8 being brooded by same males. Chick 6 being guarded by Female 6; no male present. Male 7 sitting on his nest, but the chick has moved under a rock about five feet away.

January 11, early afternoon: Males X, 0, 1, 2, 4, 5, and 6 are on their nests and partially covering their chicks. Though Males 7 and 8 are sitting on their nests, their chicks are huddled with four other unmarked chicks of similar age five feet away. *Evening:* All males are on their nests. Chicks 1 and 5 not under males and cannot be found in the gathering dusk. All other marked chicks, including Chicks 7 and 8, are under males.

January 12, late afternoon: All males on their nests, except those of Nests 6, 7, and 8 which are absent and cannot be found. All chicks—including Chicks 1 and 5, which were unaccounted for the evening before, and Chicks 6, 7, and 8, which are unguarded —are in or beside their nests.

January 13, evening: All chicks are in or beside their nests, except Chick X, which has moved to a point under a rock near Nest 5, 15 feet away, and Chick 2, which is in a crèche. Males on all nests, except Nest 7, which has no attending adult. Females 6 and 8 are standing beside their nests.

January 14, evening: All chicks are huddled in two different crèches. One, in the area of the 10 marked nests, contains Chicks X, 0, 1, 2, and 7 together with three unmarked chicks of similar age; the other, just outside the area, contains the remaining four marked chicks and five unmarked chicks. Males 0, 1, and 7 on their nests. No other marked adults observed.

January 15, morning: All chicks in one large crèche, containing altogether 18 individuals, just outside the area of the 10 marked nests. No marked adults observed, but as many as six unmarked adults of both sexes stand near the group.

On all our visits, Nest 3, which contained one egg, was always being attended by the marked female. A male, however, stood beside her on January 8 and 13. On January 10, the egg was found a foot from the nest and broken, but the female was still sitting on the nest on this date and during our succeeding visits until January 14 when we found the nest unoccupied.

Crèche Formation and Related Behavior

We noted that the chicks remained steadily with their brooding parents until well after the first week. The first chick we found out of the nest was Chick 7, on January 10, at 12 days of age. The first case of huddling in a crèche was seen on January 11. This involved Chicks 7 and 8, at 13 days of age. But it was not until January 14, when all 9 chicks were 16 days of age, that all were in crèches. Sladen (1958:60) concluded that the average age of an Adélie chick, when it goes into a crèche, is about one month.

The chicks left their nests of their own accord, even while their parents were brooding them. Departure from the nests was sometimes caused by

disturbances. For example, when a group of nests with brooding adults was approached abruptly by us, the chicks left their nests and parents, occasionally to hide under rocks, but more often to join other chicks. Or when a brooding adult and its chick were vigorously attacked by a strange adult, the chick soon left and frequently sought the company of chicks its own age. During the first absences of their young, the adults continued to sit on their nests alone, but by the time all the young had gathered in crèches, the adults no longer sat steadily on their nests and eventually deserted them entirely.

The end of a chick's stay in a crèche seemed to be determined by hunger. When in need of food, it returned to its nest site. If a parent was already on the nest, it proceeded to beg, but if not, it waited either on or near the nest, or begged for food from a neighboring adult without success. The return from a crèche was frequently hastened by a parent arriving at the nest and joining the other parent in a greeting ceremony, thereby providing a clamor sufficient to attract the chick's attention and stimulate its coming back sooner than it might have otherwise.

Among our marked birds we recorded two instances in which chicks left their crèches to join their own parents and be fed. The first was on January 13. Male 2 was alone on his nest while his chick was in a crèche 10 feet away. Female 2 soon returned from the sea to the nest and was at once joined by the male in a greeting ceremony. In a few minutes the chick left the crèche, approached its parents at the nest, gave begging calls for a short period, and was thereupon fed by the female. The second instance, on January 14, involved the family at Nest 0. What we recorded in all respects duplicated the above observations at Nest 2. In this case the chick emerged from a crèche only four feet away.

Elsewhere in the colony we saw many chicks leave crèches, walk up to displaying adults at nests, beg, and be fed. Usually each chick left by itself, but now and then we saw chicks leave a crèche together to meet an adult at a nest all the while begging anxiously, but only one chick, undoubtedly the offspring of the adult concerned, ever succeeded in getting food. The other chicks were refused food and were often vigorously repelled by jabs from the bill and whacks from the flippers.

As the chicks approached full body size (about January 25 to 29), they were fed more often by parents away from their nesting sites. Quite commonly they left crèches and approached adults as they entered the colony from the path or began walking through the colony. In places where no nests had ever been, they begged for food and frequently received it. When full growth had been attained, or nearly so, and the crèches had become loosely formed (see below), the chicks seemed to be fed anywhere in the colony and even down the path to the sea where they wandered.

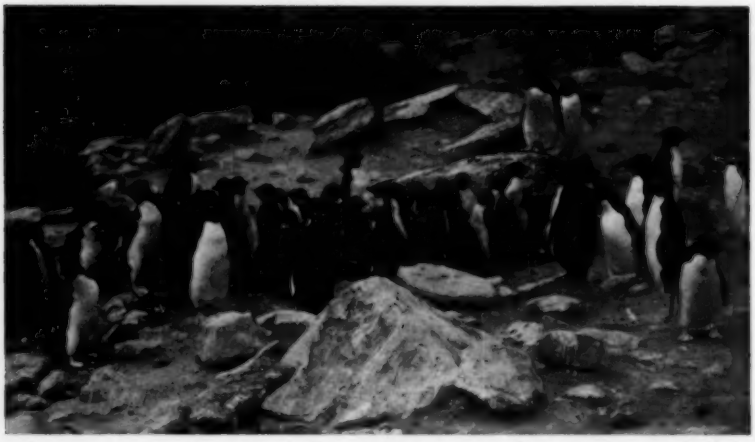


FIG. 1. A crèche of Rockhopper Penguins at New Island, Falkland Islands, January 22, 1954. The chicks are about 24 days old.

Crèches varied from day to day in number, size, and composition. At first they were many and small, each one of about a half dozen individuals; later they were fewer and larger, containing as many as 15 to 35 individuals. Rarely did the crèches contain the same combination of individuals for more than a few hours, because they were almost constantly reforming throughout the day. On leaving their nests after feeding, the chicks gathered in different combinations each time. (The Frontispiece of this article shows a few chicks starting a new crèche.) However, in their later stages, crèches more often contained the same individuals since they involved nearly all the chicks in a given section of the colony (see Fig. 1).

On January 15, when we terminated our daily visits to the marked nests, the chicks were 17 days of age—about two-thirds grown—and still down-covered. Crèche formation was at its peak, as all the individuals were in groups. Judging by what we saw in all sections of the colony during occasional visits from January 15 to 30, the crèches continued to be closely compacted groups until the chicks attained nearly full body size and had lost their down. Thereafter, the crèches became looser, the chicks standing farther apart and showing a decreasing tendency to huddle. Later, during mid-February, in the Kidney Island colony, we found crèches nonexistent; all chicks were widely dispersed among yearling birds and molting adults.

During evenings in the New Island colony, when more adults returned than at any other time in the twenty-four hours, the crèches tended to be smaller because many chicks had joined their parents for food. But the

crèches nevertheless stayed formed all night. Just before midnight on January 22 we found young in crèches, though the crèches were noticeably smaller than they were during the day.

Discussion

Our observations show that chicks of the Rockhopper Penguin are normally fed exclusively by their own parents up to, and during, the crèche stage. In the Adélie Penguin, Sladen (1958:60–61) saw only two instances of a parent giving a strange chick food, and never saw any unmarked adult feed a marked chick of marked parents. It was his conclusion that, if parent Adélies were lost, the chick died. It would therefore seem that the parent–chick bond, through the crèche stage, is a strong one in the colonial-nesting penguins. But after the chicks attain full body size and the crèches break up, I am not at all sure that the chicks are then fed, as a general rule, by their parents. At Kidney Island, in February, when the crèches were no longer in evidence, we saw fully grown young being fed by adults on the paths at great distances from the nest sites. I noted at least one instance when an adult, climbing up from the sea, responded to the begging of a fully grown young bird by regurgitating food; then, continuing up the cliff, the same adult was accosted by another begging young bird of identical size and obliged it by regurgitating more food.

The question of whether or not parents recognize their own young as individuals, and *vice versa*, interested us greatly. Our findings tend to confirm those of Sladen (1958:73) on the Adélie Penguin, namely, that adults recognize their own young, and the young their parents, by the time the young gather in the crèches. Richdale (1951:276–279) has also reported that, in the Yellow-eyed Penguin, parents and young recognize each other, but he does not indicate when recognition begins.

I am inclined to believe that a Rockhopper chick of crèche age has already become familiar with the particular greeting ceremony of its parents and learned to associate it with availability of food. On hearing and/or seeing the ceremony from the crèche, the chick promptly recognizes its parents and, if hungry, approaches them at once. I am also inclined to believe that parents recognize their chicks by appearance and begging calls. This is borne out in the cases I have described where an adult refuses food to all chicks except one, no doubt its own. Sladen (1958:72–73) holds similar concepts, based on observations closely corresponding to ours. He believes, however, that parents and chicks recognize each other more by sight than by any other means.

The Rockhopper chick's urge to leave the nest and participate in crèche formation is no doubt innate, since it shows up without fail at a certain age in all individuals. Entering a crèche is, therefore, a social response that appears early in the life of a bird noted for its pronounced social habits.

Besides satisfying an urge for companionship, does the crèche have other functions? One possibility is that a crèche may be a means whereby chicks, still downy but becoming too large to be satisfactorily brooded by their parents, may continue to offset loss of their body heat by huddling together. Admittedly this idea would seem to be more applicable to crèches of penguins in the Antarctic where air temperatures are prevailingly lower than in the Falklands. Rockhopper chicks, we found, huddled together at any time, even during the warmest hours of the warmest days. It seems to me that there would have been a fluctuation in intensity of crèche behavior in accordance with fluctuation in air temperature, had the crèche been a means of conserving body heat.

A more certain function of the crèche is that it may provide protection through "safety in numbers." We noticed that whenever we disturbed Rockhopper chicks of crèche age at their nests their tendency was to collect in bunches rather than to scatter and hide at random. Moreover, whenever we approached a crèche, the chicks in it, instead of scattering, bunched still closer together and began moving away from us as a compact group. I could not escape the conviction that huddling in a crèche was a deterrent to attacks by the Falklands' principal predator on penguin chicks, the Skua (*Catharacta skua*). Time and again we saw Skuas kill lone chicks unguarded by their parents, but no instance of a chick taken from a crèche. Most certainly the crèches must have been in some way discouraging to Skuas for otherwise we would have seen at least a few chicks taken from them. Contrary to our observations, Sladen (1958:66) noted instances in which Skuas actually pulled Adélie chicks from the crèches. However, he was impressed by the fact that Skuas were much more inclined to take weakling chicks or others that were slow to learn the dangers of being isolated from crèches.

Almost invariably we saw adults, males and females, loitering in the vicinity of the crèches (see Front. and Fig. 1), but their relationships, if any, to the chicks in the crèches were not determined. None of our marked adults was ever seen near the crèches—they were either attending their nests or absent from the colony. I watched one adult approach a crèche containing a half dozen chicks about two weeks old and attempt to brood first one and then another; and several times we watched adults approach crèches, wantonly torment the various chicks by jabs with bills and strikes with flippers, and then casually retire. It was my conclusion that these were in some cases parents which had lost their young, and in other cases were wandering nonbreeders, such as Sladen (1958:61) had noted in Adélie Penguins. In no sense did they play the role of guards. They moved away from us without reluctance or protestation, even before the crèches moved. And they showed no aggressiveness toward Skuas which occasionally flew low over them or

walked up close. However, it is entirely possible that these loitering adults inadvertently served as guards against Skuas by the mere fact that they were adults and thus potentially capable of warding off attacks on the chicks near which they were standing.

Summary

Chicks of the Rockhopper Penguin in the Falkland Islands show true crèche behavior by leaving their nests of their own accord after about 12 days of age and huddling in groups. The crèches become fewer and larger as the chicks grow older. Crèche formation reaches its peak when the chicks are about 17 days of age. As the chicks attain nearly full body size and lose their down, the crèches become increasingly less compact until they break up entirely. The chicks are not fed communally, at least through the crèche stage; instead, they are fed exclusively by their own parents. The ability of adults and young to recognize each other as individuals seems apparent. A crèche satisfies a chick's innate urge for companionship, functions possibly as a means of offsetting loss of body heat, and almost certainly provides protection against the Skua through "safety in numbers." Adult birds which commonly loiter in the vicinity of crèches are in some cases parents which have lost their young and in others wandering nonbreeders. Although these adults play no guarding role whatsoever, they may inadvertently serve, by their mere presence, to ward off attacks by Skuas.

Literature Cited

Gwynn, A. M.
1953 The egg-laying and incubation periods of Rockhopper, Macaroni and Gentoo Penguins. *Australian National Antarctic Expeditions Reports*, 1:1–29.

Levick, G. M.
1914 Antarctic penguins: A study of their social habits. McBride, Nast & Company, New York.

Murphy, R. C.
1936 Oceanic birds of South America. Volume 1. American Museum of Natural History, New York.

Richdale, L. E.
1951 Sexual behavior in penguins. University of Kansas Press, Lawrence.

Roberts, B.
1940 The breeding behaviour of penguins with special reference to *Pygoscelis papua* (Forster). *British Graham Land Expedition 1934–37 Scientific Reports*, 1(3): 195–254.

Sladen, W. J. L.
1958 The pygoscelid penguins. I. Methods of study. II. The Adélie Penguin, *Pygoscelis adeliae* (Hombron & Jacquinot). *Falkland Islands Dependencies Survey, Scientific Reports* No. 17.

Stonehouse, B.
1953 The Emperor Penguin, *Aptenodytes forsteri* Gray. I. Breeding behaviour and development. *Falkland Islands Dependencies Survey, Scientific Reports* No. 6.

WAYNE, MAINE, JANUARY 18, 1960

A POPULATION STUDY OF THE SPARROW HAWK IN EAST-CENTRAL ILLINOIS*

BY JAMES HARRIS ENDERSON

THE aim of this investigation was to obtain an understanding, both quantitative and qualitative, of the population movements of the Sparrow Hawk (*Falco sparverius*). A study similar to this one was carried on in Michigan and Wyoming by the Craigheads (1956). No organized study of the Sparrow Hawk has been made in Illinois. Fifty years ago this species was a "very common breeder" in the immediate area of this study, according to Hess (1910), and this holds true today. The Sparrow Hawk is a permanent resident in central Illinois.

A study area of 43 square miles was outlined during the winter 1958–59, five miles southeast of the University of Illinois campus (Fig. 1). This area is typical of the region, i.e., fertile cultivated land. The only areas with standing timber are those immediately adjacent to the river. Scattered trees occur in farm yards and along fences and roads.

I extend sincere thanks to my advisor, Dr. S. C. Kendeigh, for his many suggestions concerning all phases of this work. The efforts and interest of Dr. R. R. Graber and of my wife Dayle are also appreciated.

METHODS OF STUDY

It was not possible to census the entire area during each daily trip, but the area was covered many times in the course of the study. No attempt was made to search every likely location for Sparrow Hawks, but all conspicuous perches were scanned with the aid of binoculars. Fortunately, the birds seemed to prefer areas within a few yards of the roadways for hunting and perching. The order of coverage of the area was not systematic, except that when a bird was located I tried to find it on subsequent trips. No censuses were taken on days of low visibility or heavy precipitation.

It soon became apparent that some means of identifying individual birds would be necessary in order to trace their movements more accurately. Birds were seldom observed at the same location on successive trips.

Two types of traps were used to catch birds for marking. The first trap used was of the bow-net type, described in detail by Tordoff (1954). From February 10 to March 25, 16 Sparrow Hawks were caught with this type of trap. Because the success of this trap was relatively low, another type was then employed. It consisted of a small circular wire cage, the top of which was covered with many nylon nooses (Berger and Mueller, 1959). A live house mouse (*Mus musculus*) was placed in the trap as bait. When using

* Revised portion of M.S. Thesis submitted at the University of Illinois.

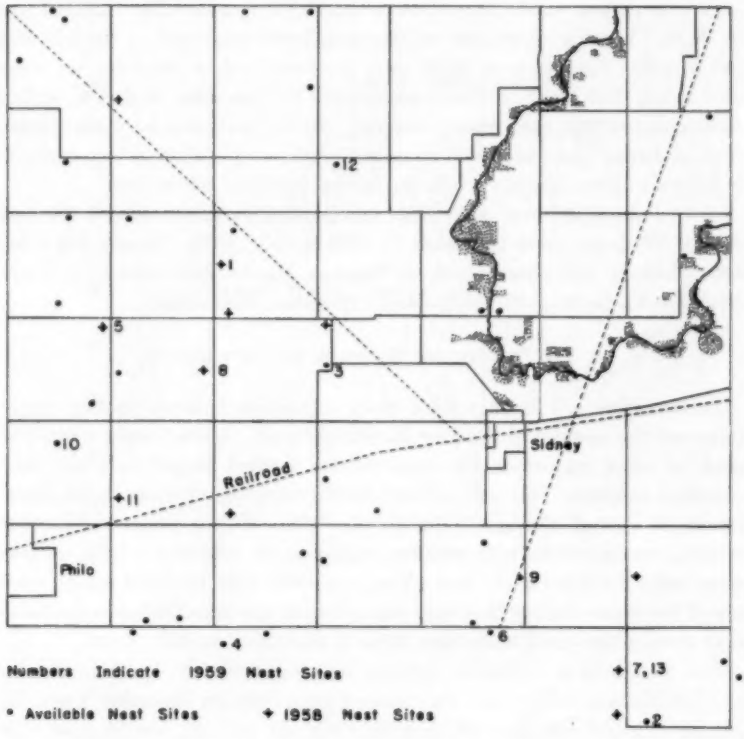


FIG. 1. The study area.

this trap, as many as eight Sparrow Hawks were caught and marked in a single day. During the period between April 3 and April 13, 23 birds were caught, bringing the total to 39. Between April 13 and July 6 an additional falcon was caught, and three were retrapped. Forty-two per cent of the Sparrow Hawks observed on the area, and 76 per cent of the breeding population, were caught.

All birds caught were banded with Fish and Wildlife Service bands. In addition, each bird was marked by means of a notch or "hole" in the primaries or secondaries of either or both wings. The location of this mark was varied to give individuals identity. The "hole" effect was most satisfactory. It was achieved by removing the barbs from the feather shafts in a circular area about one and one-half inches in diameter. With binoculars

such a mark was visible for at least a quarter of a mile while the bird was in flight. A similar procedure of removing barbs was used on the tail with less success. Finally, most birds were provided with a short leather strap on one leg. This strap facilitated recognition of a perching bird as a marked individual, so that unnecessary trapping efforts would not be made. Aside from an initial annoyance with strap and band, none of the marking methods is known to have interfered with the normal activities of the bird.

A total of slightly over 3000 miles was traveled by automobile on the area during 308 hours from December 1, 1958 to July, 1959. During this time, approximately 500 observations of Sparrow Hawks were recorded. Forty adult birds were trapped and marked (22 males, 18 females).

The Effect of Weather on Censusing

In December and January there was a correlation between weather conditions and the number of Sparrow Hawks observed. A less formal count was made of other raptors on the area, and the weather seemed to affect their observed numbers. This was not true during censusing of winter hawk populations in central Michigan (Craighead, 1956). Fig. 2 presents data correlating census results with weather conditions as measured on the campus seven miles from the study area. Wind velocities were recorded on the rooftop of the Water Survey Building. According to the State Climatologist these may average one-third lower than those in the open country.

Fig. 2 suggests a correlation between high wind velocity, low temperature, and low bird-per-mile count. On censuses taken between December 4 and 18, January 15 and February 11, and February 15 and 27, low bird-per-mile counts were obtained during periods of generally low temperatures and high wind velocities. Between March 13 and 18, high wind velocity seems to have resulted in a low census count despite moderate temperatures. However, on the census taken on December 3 and on the February 27 census, few or no birds were seen although temperatures and wind velocities appeared normal. In general the correlation does not continue into warm weather.

These census results are probably caused by two factors: (a) the buffeting effects of the wind causing the birds to seek shelter, and (b) the increased loss of body heat due to wind and low temperature. Several observations of Sparrow Hawks under these conditions support this theory. Apparently low temperature alone does not cause the birds to seek shelter. On different occasions Sparrow Hawks were seen perched near or on the ground avoiding wind, or on a branch close to the tree trunk. In these positions the birds would be inconspicuous to an observer.

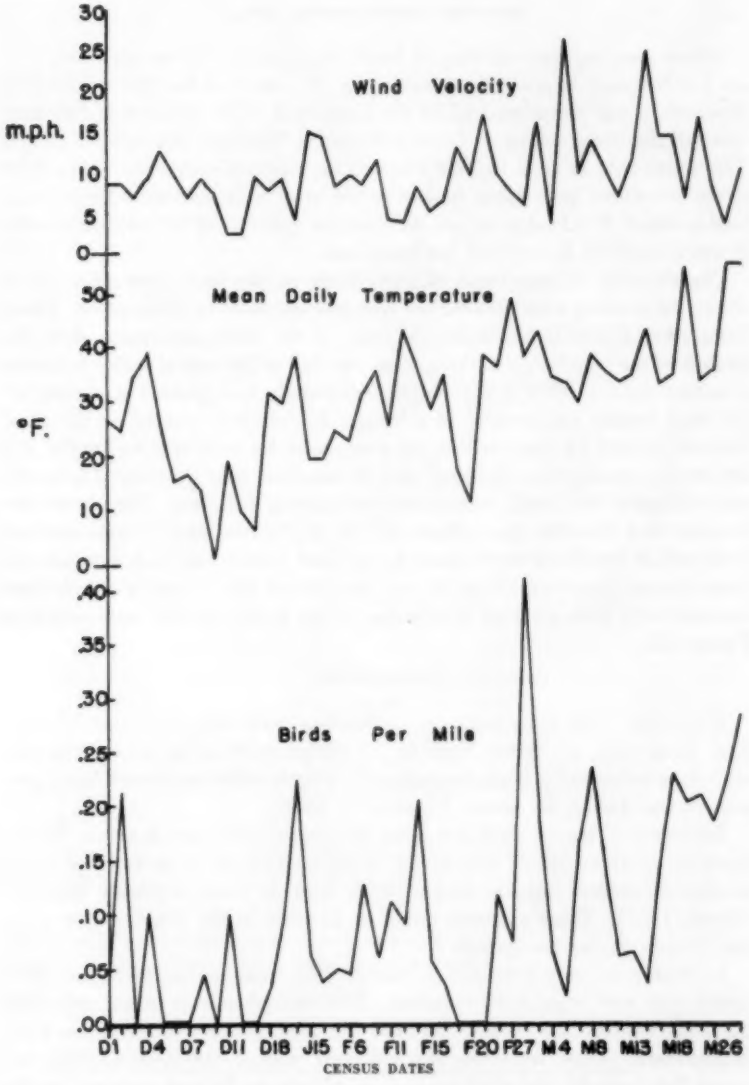


FIG. 2. The effects of wind velocity and temperature on censusing.

Records of Individual Birds

Before trapping and marking of birds began, a bird of the same sex seen on a subsequent trip within three-fourths of a mile of the site of the first observation was considered to be the same bird. This distance is less than one-half the winter range of Sparrow Hawks in Michigan (Craighead, 1956). The uncertainty as to individual identity was reduced somewhat by the relatively low winter population density on the area, with individual birds being well isolated. If a bird were not observed for a period of two to three weeks, it was considered to have left the study area.

The duration of occurrence of individuals on the study area (Fig. 3) is shown by drawing lines between the first and last dates of observation. These lines, when placed in chronological order of the first appearance, show the growth of the population in the spring. An "x" at the end of a line indicates a nesting failure. Bird 1 was caught accidentally in a padded steel trap set for large hawks, and because of a broken leg was not released on the area. Females 13 and 14 remained on the study area for over two weeks, but did not select a nesting site. Birds 25 and 29 remained near a group of trees for approximately two weeks but showed no nesting behavior. They were not considered a breeding pair. Birds 12, 16, 21, 33, 36, and 37 were marked birds which remained on the area for a short period only and were among those termed transients. Bird R near the top of Fig. 3 was a female that renested with Male 22 after destruction of the young of that male mated to Female 28.

Populations

Wintering.—The true wintering population may have consisted of only four birds (Fig. 4). Four birds on 43 square miles is in close agreement with data collected in Michigan, where 37 square miles supported five Sparrow Hawks during the winter (Craighead, 1956).

Transient.—There is evidence from banding returns that Sparrow Hawks from the northern plains area winter in the vicinity of Texas and that more northerly breeders migrate farther south than do more southerly breeders (Roest, 1957). These migrants effect an increase in the population in Central Illinois during the spring.

Beginning in early February, a total of 58 transients, i.e., birds not associated with nest sites, were observed. This undoubtedly does not represent the total number that passed through the area because observations were fragmentary. These transients reached their highest observed densities between February 25 and May 4 (Fig. 4). Peaks in their abundance on the area occurred on March 4, April 10, and April 12. Transients continued to be observed until the end of the observations in June. Transients observed

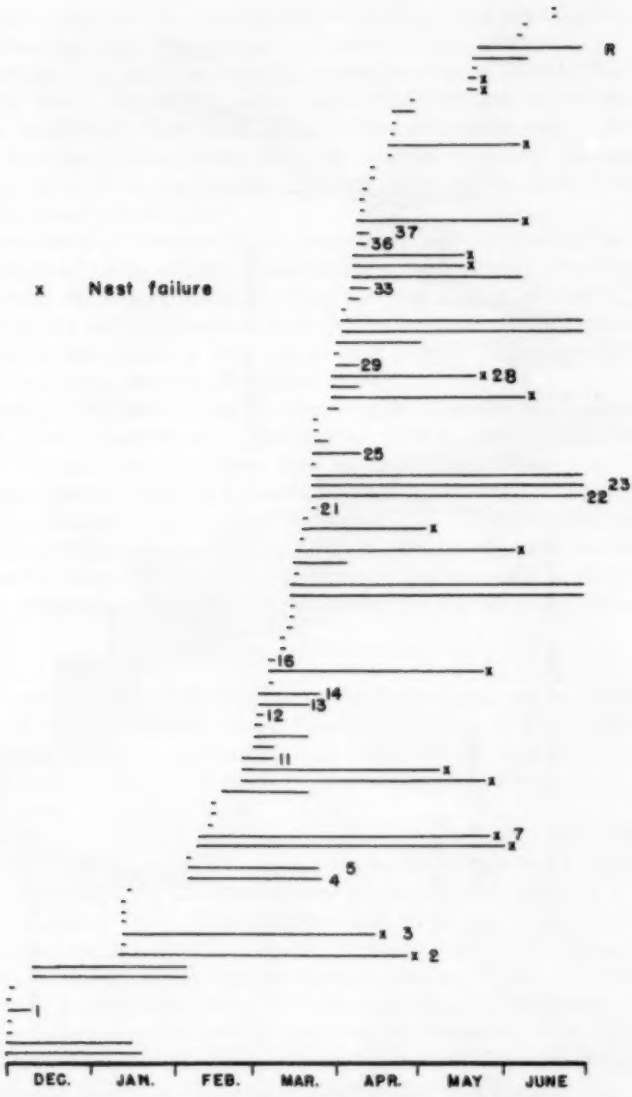


FIG. 3. Duration of occurrence of individuals on the study area.

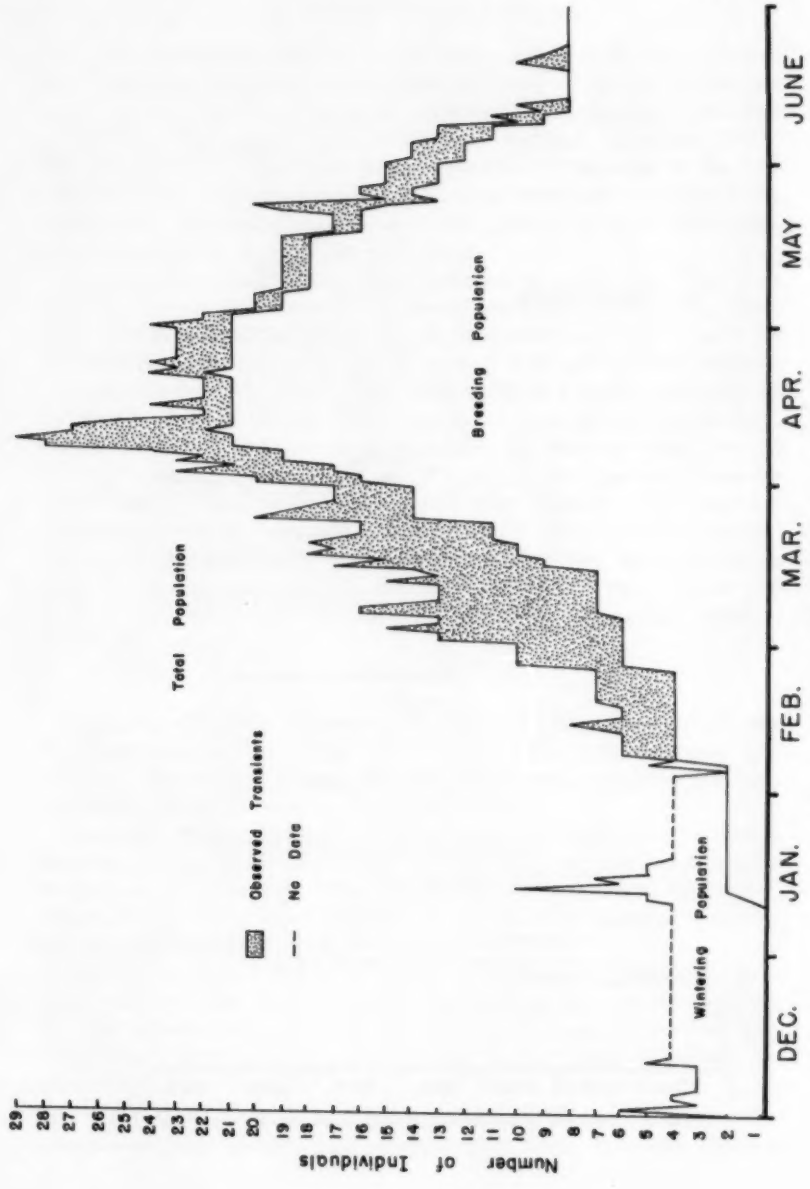


FIG. 4. Variations in the Sparrow Hawk population.

after the beginning of the nesting period may have been unsuccessful breeding birds from other areas, or part of a nonbreeding population.

Breeding.—The potential breeding population built up steadily, beginning with one bird on January 11, until a peak of 22 birds was reached on April 11 and on April 22. After April 22 there was a gradual decrease in the number of breeding birds until the end of the observation period. The majority (94 per cent) of the unsuccessful breeding pairs left the study area soon after the failure of their nests.

Twelve pairs of Sparrow Hawks were recognized as breeding birds, as demonstrated by their selection of nest cavities. An additional female renested with one of the original males, bringing the total number of breeding individuals to 25, or 0.58 breeding birds per square mile. This population is denser than that found in Michigan in 1948 when 0.22 breeding birds per square mile were recorded (Craighead, 1956).

Breeding individuals entered the area in greatest numbers (15) during the period when transients were appearing in greatest numbers, i.e., between March 15 and April 10. These dates encompass the period of arrival of breeding Sparrow Hawks at Corvallis, Oregon (Roest, 1957).

The members of a pair may arrive separately, or they may arrive together. The males of five pairs were observed first. The female was observed first for another pair, both appeared on the area simultaneously in three cases, and no observations were made in this respect for the remaining three pairs.

Range and Nest Data

An approximation of the diameter of the bird's range can be obtained by means of a line connecting extreme observation points. In Fig. 5, Ranges 3, 4, and 5 are those of nonbreeding birds which left the area before egg-laying. Ranges 3 and 4 are those of a nonbreeding pair. Ranges 2, 6, 7, and 23 are those of breeding birds.

The three nonbreeding bird ranges recorded in late winter have maximum observed diameters of 1.4, 2.0, and 1.3 miles; the average is 1.5 miles. This figure is less than the 2.2 miles average of winter ranges observed in Michigan (Craighead, 1956). This difference may be due to an error introduced when observing unmarked birds in the Michigan study, or it may be caused by the fact that the study area in Michigan, having 11 per cent tree cover and bushy areas is a less favorable habitat for hunting by Sparrow Hawks, causing them to range farther to meet food requirements.

Ranges 2, 6, 7, and 23 represent home ranges in the vicinity of nest sites. The average maximum diameter of these ranges is 1.4 miles. This agrees closely with the 1.5-mile average diameter for breeding ranges observed in Michigan and in Wyoming.

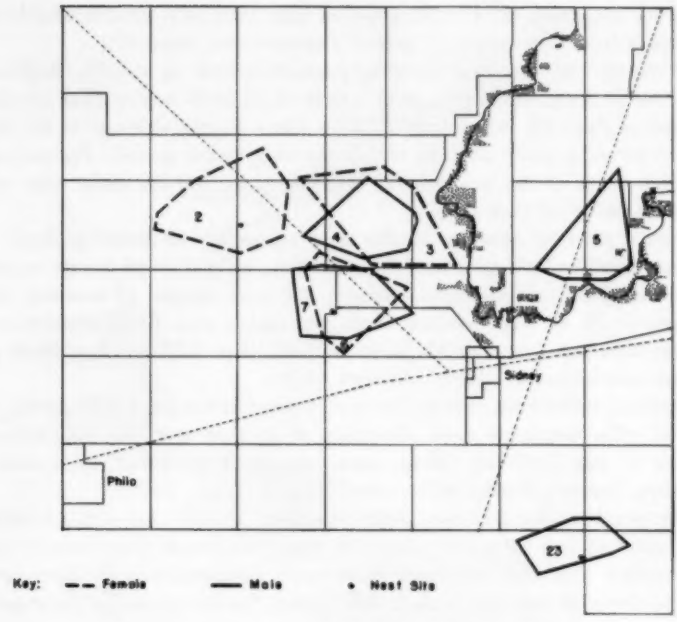


FIG. 5. Observed ranges of individual Sparrow Hawks.

The nest site does not necessarily lie in the center of these home ranges. Evidently certain areas for hunting are preferred to others by nesting birds.

Although observations of egg and brood dates were not thorough, practical approximations can be made. The first egg was laid on the study area on April 16. The first complete clutch of five was completed about April 22. The last clutch of five was completed about April 29. On May 20, the first bird on the study area hatched, and the last on the area hatched about May 28. The young of the renesting pair did not leave the nest until about July 20, although the other nestlings on the area had left the nest by June 19.

SUMMARY AND CONCLUSIONS

(1) Weather conditions under which observations of Sparrow Hawks were made affected the success of the censusing; fewer birds were observed during periods of high wind velocity and low temperatures.

(2) The dates of first occurrence of individuals on the 43-square-mile study area in the spring follow a sigmoid curve.

(3) Although the wintering population fluctuated in numbers, approximately four birds were present on the area during December and January.

(4) Transients, totaling 58, were observed on the area from early February to the last of June, being most numerous in March and April.

(5) The breeding bird population increased from January 11 to the middle of April, and then decreased.

(6) Twenty-five Sparrow Hawks were recognized as breeding birds, an average of 0.58 individuals or 0.29 pairs per square mile.

Literature Cited

Berger, D. D., and H. C. Mueller
1959 The bal-chatri: a trap for birds of prey. *Bird Banding*, 30:18–26.

Craighead, F. C., and J. J. Craighead
1956 Hawks, Owls, and Wildlife. The Stackpole Co., Harrisburg, xix/443.

Hess, I. E.
1910 One hundred breeding birds of a central Illinois ten-mile radius. *Auk*, 27: 19–32.

Roest, A. I.
1957 Notes on the American Sparrow Hawk. *Auk*, 74:1–19.

Tordoff, H. B.
1954 An automatic live trap for raptorial birds. *Journ. Wildl. Manag.*, 18:281–284.

18 South May St., Joliet, Illinois, August 15, 1959

NEW LIFE MEMBER

Mr. Frederick M. Helleiner, of Swastika, Ontario, Canada, is an elementary school teacher and boy scout adviser who is interested in the field distribution of birds. Most of his field work is done in the Timiskaming District of northern Ontario, but he has also compiled a list of the birds of the Peace River District of Alberta.

Mr. Helleiner has been an active member of the Wilson Ornithological Society since 1952, presented a paper at the Society's 1955 meeting in Stillwater, Oklahoma, and now becomes a Life Member. In addition, he is a member of the A. O. U., a director of the Federation of Ontario Naturalists, President of the Kirkland Lake Nature Club, and a member of the Ottawa Field Naturalists' Club, the Toronto Field Naturalists' Club, and the Saskatchewan Natural History Society.

MEASUREMENT OF SOME LAKE-SHORE TERRITORIES OF THE SONG SPARROW

BY RODERICK A. SUTHERS

THIS paper presents data concerning the size and measurement of four adjacent Song Sparrow (*Melospiza melodia*) territories located along the northwest shore of Bear Paw Point, Lake Itasca, Clearwater County, Minnesota.

An attempt has been made to compare the territorial variations within a single species. Song Sparrows nesting on islands have been reported to fledge young successfully in areas less than one-tenth the size required in mainland situations (Beer *et al.*, 1956). In the present study, lake-shore territories were measured in order to retain the effects of shore line on territory size without the probable insular influences affecting the results of Beer *et al.* (*ibid.*) and Swedberg (1957).

The shore line studied rises a few feet above the level of the lake. The ground dips inland to form a boggy area—especially pronounced in the areas occupied by Pairs 2 and 3—before rising again to a mixed forest of conifers and hardwoods. The Song Sparrows held a single row of territories between this forest and the lake. The woods in this strip were rather open because of much windfall. Dominant canopy species included black ash (*Fraxinus nigra*), American elm (*Ulmus americana*), basswood (*Tilia americana*), paper birch (*Betula papyrifera*), and balsam fir (*Abies balsamea*). In the shrub layer, alder (*Alnus crispa*), paper birch, balsam fir saplings, and raspberry (*Rubus idaeus*) were present. The ground cover was of grasses (*Poa palustris, P. pratensis*), sedges (*Carex* sp.), and a little cattail (*Typha latifolia*). The nomenclature used here follows that of Fernald (1950).

The area was mapped with the aid of a compass and by pacing. Later accurate measurement of 11 of the approximately 80 paced distances indicated that pacing may have given results averaging about 3 per cent too long. I do not believe this exaggeration has a significant effect on the results, since the distances paced were rarely as long as 100 feet and often were less than 50 feet. Observations were made from 4:00 to 9:40 a.m. and from 3:15 to 7:35 p.m. (Standard Time).

Territories were measured according to the method described by Odum and Kuenzler (1955). The position of either member of a pair was recorded at approximately 5-minute intervals on a map of the study area. After about every 10 such spot observations, the outermost were connected by straight lines to form the largest possible polygon. The area of this polygon was then plotted on a graph using area as the ordinate and the number of observations as the abscissa. This was repeated for each additional 10 observations, and a

smoothed curve was drawn through the successive points. *Maximum territory*, as defined by Odum and Kuenzler (*ibid.*), is the point at which, according to the observation-area curve, an additional 10 observations increases the area less than 10 per cent. I also determined the point at which 10 observations increased the area less than 1 per cent. This I shall call the *utilized area* to avoid confusion with the maximum territory.

I am indebted to J. T. Emlen, Jr., J. J. Hickey, W. H. Marshall, and W. D. Stull of the Lake Itasca Forestry and Biological Station for advice during the course of this study. I also wish to acknowledge the financial support of The Edward L. Rice Zoology Scholarship from Ohio Wesleyan University, for which I am very grateful.

Results and Discussion

The maximum territories varied from 0.30 to 0.65 acre and averaged 96 per cent of the utilized area (Table 1). Although measurements of the utilized area for Pair 3 were not completed to the 1 per cent increment level, the observation-area curve for this pair indicates that 0.55 acre is probably within 0.01 acre of the actual size of the utilized area.

Table 1

Comparison of Utilized Area and Maximum Territory

Type of Measurement	Pair				Mean
	No. 1	No. 2	No. 3	No. 4	
Utilized area (acres)	0.34	0.68	0.55[1]	0.31	0.47
Maximum territory					
acres	0.32	0.65	0.53	0.30	0.45
as per cent of utilized area	94	96	96	97	96

[1] Measured with a 4.4 per cent increase as a result of the final 10 observations; all other utilized areas involved a 1 per cent increase or less in the final 10 observations as defined in the text.

Palmgren (1933) observed that a pair of birds may utilize only a part of its territory for from one to several successive days. Thus, if a territory is measured in a short period of a few days, the entire territory may not be included. I used two methods to check the possibility of this kind of error in my measurements: Remeasurement of the territory several days after the utilized area was first determined, and spot observations distributed over successive days after the initial determination of size.

The territory of Pair 2 was remeasured four days after the utilized area had been calculated. This new polygon added 0.02 acre not previously included and so increased the utilized area by 3.1 per cent. The territory of Pair 1 was remeasured eight days after the utilized area was calculated. The new polygon lay entirely within the utilized area as previously calculated.

TABLE 2
REPORTED SONG SPARROW TERRITORY SIZES (IN ACRES)

	Minimum	Mean	Maximum
Mainland (Nice, 1937, 1943)	0.5	0.67	1.5
Lakeshore (this study)	0.31	0.47	0.68
Island (Beer *et al.*, 1956)	0.04	—	—
(Swedberg, 1957 MS)	—	0.2	—

Nine spot observations distributed over six successive days, for Pair 4, gave a polygon enclosing 16 per cent of the utilized area and lying entirely within it.

Mainland territories in central Ohio were studied extensively by Nice (1943:152). She found that "in a region well filled with Song Sparrows" the average territory size was about two-thirds acre with a range from 0.5 to 1.5 acres. She emphasized (1937:205, 207) that "a fundamental trait of the Song Sparrow is that *it does not allow itself to be crowded*" and that the upper limit of a Song Sparrow population is fixed by territorial behavior.

Insular territories have been studied in Basswood Lake, Minnesota, by Beer *et al.* (1956). Two islands, each with an area of 0.04 acre, were found to have a pair of Song Sparrows nesting on them. One of these, Island 8, was used as a nesting area in each of six successive years. Swedberg (1957 MS) studied Song Sparrow territories on Schoolcraft Island, Lake Itasca, Minnesota. The territories of these pairs averaged 0.2 acre.

The four lakeshore territories I measured averaged 0.47 acre and were thus intermediate between sizes reported for mainland and those reported for island situations (Table 2).

As pointed out by Stickel (1954) and by Odum and Kuenzler (1955), caution must be used in comparing sizes of territories calculated by different methods. The home range, defended territory, and utilized territory may vary considerably among themselves and with the nesting cycle. Food-carrying activities of the parent sparrows which I observed would indicate that I measured their territories during the late incubation and young nestling stages. There appeared to be no measurable areas that were not utilized in any of the four territories. Pair 1 was even found to use several hundred square feet of upland forest floor as a feeding area, indicating that territorial boundaries may not always be safely assumed from the characteristics and distribution of the vegetation.

If home range is defined as the area in which an animal is usually found during a given season (Burt, 1946:20), then utilized area is probably analogous to the seasonal home range of Burt (*ibid.*). Stenger and Falls (1959), using a modified Odum and Kuenzler method on the measurement of Oven-

TABLE 3
PERCENTAGE OF UTILIZED AREA REMAINING WHEN OUTER OBSERVATIONS WERE EXCLUDED

Per cent of Observations Excluded	Pairs				Mean
	1	2	3	4	
2	79 (0.27) *	96 (0.65)	95 (0.52)	97 (0.30)	92 (0.44)
5	74 (0.25)	91 (0.62)	95 (0.52)	87 (0.27)	87 (0.42)
7	68 (0.23)	87 (0.59)	95 (0.52)	87 (0.27)	85 (0.40)
10	47 (0.16)	84 (0.57)	91 (0.50)	87 (0.27)	78 (0.38)
Number of Observations	49	67	41	62	54.75

* Acres in parentheses.

bird (*Seiurus aurocapillus*) territories, reported the outer 5 per cent of their spot observations were more isolated than the rest. They termed the area excluding these the "total utilized territory." While these authors imply that this 5 per cent is easily identified, the map that they present as an example shows the excluded percentage to be 6.4. Stenger and Falls found that these utilized areas for adjacent males varied in position from day to day but were distinct on any given day. This variation in daily position is not evident for the four Song Sparrow pairs that I studied.

When I excluded the outer 2, 5, 7, and 10 per cents from the utilized areas there resulted a rather even decrease in the size of territories of Pairs 1 and 2, but for Pairs 3 and 4 the progressive subtraction gave uneven results (Table 3).

It would be interesting to know if the extremely small territories of some island-nesting birds are supplemented by feeding areas on nearby shores. The two island territories of 0.04 acre described by Beer *et al.* (1956) were about one-eighth mile or less from the shore (L. D. Frenzel, pers. comm.). Schoolcraft Island is approximately 190 yards from the nearest shore. During June and July, 1959, L. D. Frenzel (pers. comm.) on several occasions saw Song Sparrows fly between Schoolcraft Island and the west shore—a distance of about 330 yards. During this same period, Mrs. J. J. Hickey (pers. comm.) saw a male Yellow Warbler (*Dendroica petechia*) fly from the east shore of Lake Itasca to Schoolcraft Island (*ca.* 200 yards). During 3 hours of observations from a canoe, however, in the early morning of July 5 and in the evening of July 13, 1959, I saw no Song Sparrows leave the island. Those seen in transit may well have been part of a drifting population of unmated birds, for

it is difficult to conceive of a strongly territorial bird with a Type A territory (Nice, 1941) regularly leaving it to feed in an undefended area or defending a separate feeding area.

The size of a bird's territory is no doubt determined by a number of interrelated factors. The relative importance of a given factor varies from one species to another. Dixon (1956) found that the distribution of blocks of woodland was an important factor contributing to the stability of Plain Titmouse (*Parus inornatus*) territories. These habitat features tended to form "neutral boundaries," i.e., boundaries not adjoining another territory (Southern and Morley, 1950). The inland boundary, as well as the lake-shore frontage, of the Song Sparrow territories I measured qualifies as such a neutral boundary. Stenger (1958) reports that the territory size of Ovenbirds varies inversely with the amount of invertebrate food present in the litter of the forest floor. In his study of the Song Sparrow (*M. m. samuelis*) population of San Pablo Salt Marsh, Richmond, Contra Costa County, California, Johnston (1956*a*) found that the size of the territory varied with the density and that the birds tended to "select particular habitats over others that they could conceivably live in" (Johnston, 1956*b*). Young (1951), however, found that density of Robins (*Turdus migratorius*) is not limited by their territories, which can be compressed and often overlap.

As habitat approaches the optimum for a species, it is logical to assume that the size of the maximum territory approaches that of the space actually utilized, which is itself decreased. The lower limit of the latter may be surprisingly small when all a species' requirements are met. The shore-line community is especially rich in insect life, has sufficient light to provide a band of dense brush required by Song Sparrows, and offers them immediate access to water. Thus it probably provides an optimal habitat for this species. In small islands the ratio of shore line to area is, of course, increased, and maximum densities of Song Sparrows reported for these islands seem to be logical. I do not, however, feel that the minimal figure of 0.04 acre for insular Song Sparrow territories (Beer *et al.*, 1956) should be accepted without further investigation in which the possibility of the birds crossing water to the mainland is completely ruled out. More information is needed concerning the distance island-inhabiting birds will fly *daily* over water.

Summary

The territories of four pairs of Song Sparrows nesting along a lake shore in Clearwater County, Minnesota, were measured. The utilized area averaged 0.47 acre. The maximum territory averaged 96 per cent of the utilized area. Checks on original measurements in one case added 0.02 acre to the utilized area, and in two other instances did not change it. Deduction of given percentages of the peripheral locations caused a fairly even decrease in size of

two territories, but caused an uneven decrease in the others. The size of lakeshore territories was found to be intermediate between those reported by other workers for Song Sparrows on islands and for those on mainlands.

Literature Cited

Beer, J. R., L. D. Frenzel, and N. Hansen
1956 Minimum space requirements of some nesting passerine birds. *Wilson Bull.*, 68:200–209.

Burt, W. H.
1946 The mammals of Michigan. University of Michigan Press, Ann Arbor, 288 pp.

Dixon, K. L.
1956 Territoriality and survival in the Plain Titmouse. *Condor*, 58:169–182.

Fernald, M. L.
1950 Gray's manual of botany (8th ed.). American Book Co., New York, 1632 pp.

Johnston, R. F.
1956*a* Population structure in salt marsh Song Sparrows. Part I. Environment and annual cycle. *Condor*, 58:24–44.
1956*b* Population structure in salt marsh Song Sparrows. Part II. Density, age structure, and maintenance. *Condor*, 58:254–272.

Nice, M. M.
1937 Studies in the life history of the Song Sparrow. I. *Trans. Linn. Soc. N. Y.*, 4:1–247.
1941 The role of territory in bird life. *Amer. Midl. Nat.*, 26:441–487.
1943 Studies in the life history of the Song Sparrow. II. *Trans. Linn. Soc. N. Y.*, 6: 1–328.

Odum, E. D., and E. J. Kuenzler
1955 Measurement of territory size and home range size in birds. *Auk*, 72:128–137.

Palmgren, P.
1933 Die Vogelbestände zweier Wäldchen, nebst Bemerkungen über die Brutrevier-theorie und zur quantitativen Methodik bei Vogelbestandaufnahmen. *Ornis Fennica*, 10(3–4):61–94.

Southern, H. N., and A. Morley
1950 Marsh-tit territories over six years. *Brit. Birds*, 43:33–47.

Stenger, J.
1958 Food habits and available food of Ovenbirds in relation to territory size. *Auk*, 75:335–346.

Stenger, J., and J. B. Falls
1959 The utilized territory of the Ovenbird. *Wilson Bull.*, 71:125–140.

Stickel, L. F.
1954 A comparison of certain methods of measuring ranges of small mammals. *Jour. of Mammalogy*, 35:1–15.

Swedberg, K. C.
1957 MS Song Sparrow territories on Schoolcraft Island, Itasca Park, Minnesota. (Paper 46) filed at Itasca Forestry and Biological Station, Lake Itasca P. O., Minn. 9 pp. + 4 maps.

Young, H.
1951 Territorial behavior in the Eastern Robin. *Proc. Linn. Soc. N. Y.*, 5:1–37.

129 Griswold St., Delaware, Ohio, November 3, 1959

SEASONAL CHANGES IN WOOD DUCK ROOSTING FLIGHT HABITS[1]

BY ELWOOD M. MARTIN AND ARNOLD O. HAUGEN

MOST people are aware that such birds as crows and blackbirds congregate nightly in large numbers at roosts during late summer and fall, but few people know that Wood Ducks (*Aix sponsa*) have a similar habit. Wood Ducks prefer marshes and swamps in wooded bottomlands for many of their activities including roosting.

Morning and evening roosting flight habits of Wood Ducks were studied from March through November, 1958, in Iowa as part of an investigation of Wood Duck census techniques (Martin, 1959). Little effort had been made previously to determine Wood Duck flight habits. Such information is necessary to evaluate roosting flight counts.

Muskrat Lake, a backwater slough along the lower reaches of the Iowa River in Louisa County, Iowa, was the main Wood Duck roosting flight study area. Wood Duck roosts were found by observing and tracing flights to and from the roosts. Two flights followed narrow, well-defined paths to roosts, and counts were made along those routes as well as at the roosts. Observation points were established where a clear view of flying Wood Ducks, silhouetted against a background of sky, could be obtained to facilitate counting during poor light at dawn and dusk. Observations of morning and evening flights at Muskrat Lake permit examination of some interrelationships between seasonal change and Wood Duck roosting flight habits.

CHANGES IN FLIGHT TIMES

Several changes in roosting flight habits occurred as the season advanced. Both morning and evening flights changed gradually, occurring nearer darkness and over shorter periods of time as the season advanced (Figs. 1, 2).

Linear regression techniques similar to those of Snedecor (1956) were employed to aid in describing the changes which occurred in the Wood Duck roosting flights at Muskrat Lake as the season progressed from early August to late October. Because the statistical analyses were only approximate for the data involved, emphasis was placed on the descriptive tools of regression techniques rather than on tests of significance, though the latter were not omitted.

Time at which the first Wood Duck was seen leaving the roost, time at which Wood Ducks were leaving the roost in greatest numbers, and time when the last Wood Duck was seen leaving the roost were plotted for each morning flight count (Fig. 3). For purposes of computation, dates were

[1] Journal paper No. 3720 of the Iowa Agricultural and Home Economics Experiment Station, Ames, Iowa.

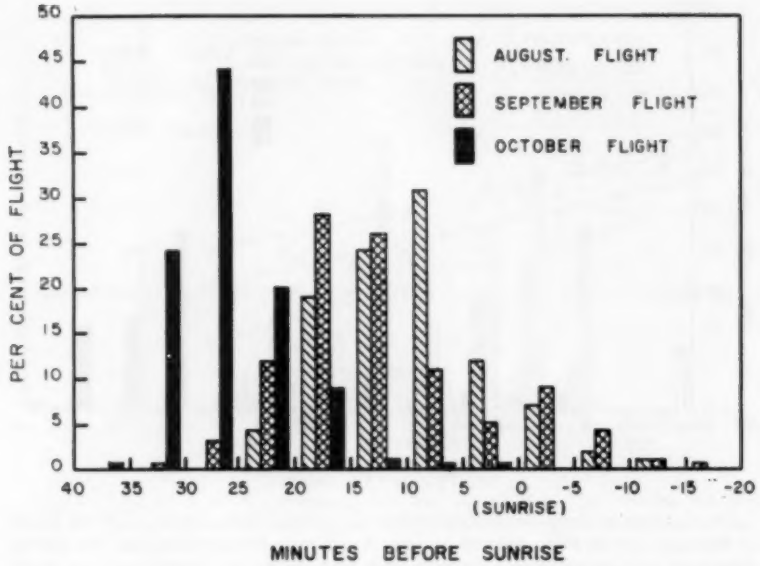


FIG. 1. Average daily distribution of morning roosting flight activity of Wood Ducks at Muskrat Lake in 1958. (August averages based on a 134-bird index from six counts. September averages based on a 283-bird index from 10 counts. October averages based on a 1106-bird index from seven counts.)

numbered consecutively, with August 1 as the zero-point. The regression coefficient, the statistic computed and tested, is affected neither by choice of origin nor by corresponding choices of intercept points. Numbers corresponding to dates of counts were then used in calculations. Linear regression of daily flight time on date of count measured from August 1 was computed for each of the three times mentioned above (Fig. 3). Each regression coefficient is significant at the 0.1 per cent probability level. The regressions indicate that on the average for each 10-day period which passed, Wood Ducks left the roost 4 minutes earlier relative to sunrise. Similar calculations were made for times of earliest, peak, and latest roosting flight activity for each evening flight observed at Muskrat Lake (Fig. 4). Each regression coefficient is significant at the 0.5 per cent probability level. The indication is that on the average for each 10-day period later in the fall, Wood Ducks arrived at the roost about 7 minutes later relative to sunset.

The method of analysis is approximate for this type of data. Changes in

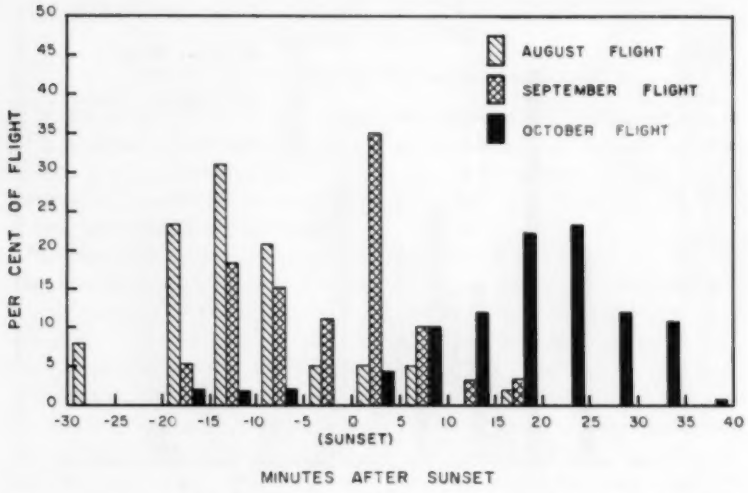


FIG. 2. Average daily distribution of evening roosting flight activity of Wood Ducks at Muskrat Lake in 1958. (August averages based on a 39-bird index from five counts. September averages based on a 199-bird index from six counts. October averages based on a 1057-bird index from seven counts.)

habitat (water level, food supply) or changes in population size as well as chronology of the season may have influenced the time schedule of Wood Duck roosting flight activity. Also, these regressions of flight times on dates are probably not linear, but instead, slope more steeply early in the season and less steeply later in the fall. The approximations are suitable for practical applications to field work, however.

Major morning flight activity in September and October took place before sunrise, and major evening flight activity in October occurred after sunset. Martin (1957) found similar habits in Wood Ducks in Indiana. Smith (1958) reported that in Louisiana in both late August and late September, greatest evening flight activity took place between one-half hour before sunset and darkness, which also agreed with findings in southeast Iowa. Hester (1955), working in North Carolina, also noted that evening flights occurred well after sunset late in the season. Observations made in north-central Iowa subsequent to this study indicated that morning and evening flights in that area in August occurred nearer darkness than they did in southeast Iowa. Evening flights on the north-central area in August occurred after sunset, and morning flights started one-half hour before sunrise and lasted 20 minutes.

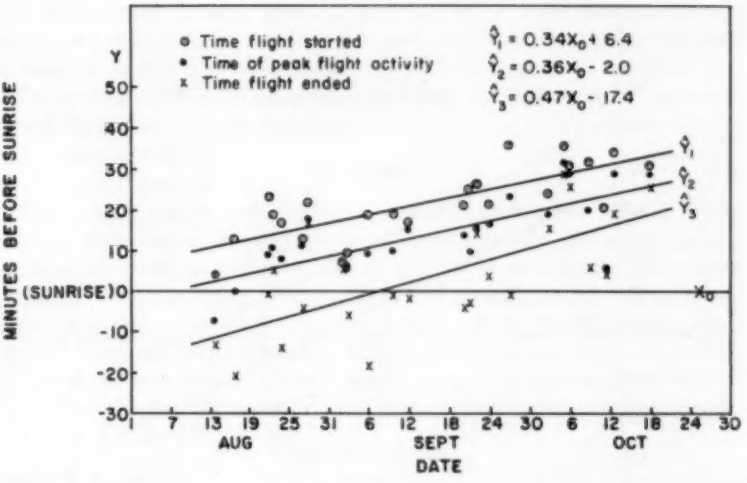


FIG. 3. Comparison of the starting, peak, and ending times for morning roosting flights of Wood Ducks at Muskrat Lake in 1958. The linear regression of time on date of count is plotted for each.

DURATION OF FLIGHT ACTIVITY

Duration of flight activity tended to shorten in both evening and morning flights as the season progressed. Converging lines on Figs. 3 and 4 indicate this change. It is more evident when the period of greatest activity is traced through the season. Duration of periods of major morning flight activity (about 90 per cent of the Wood Ducks seen in a flight) averaged 19 minutes (range 6 to 40 minutes) in August, 17 minutes (range 2 to 34 minutes) in September, and only 6 minutes (range 4 to 12 minutes) in October. Average duration for major evening flight activity was 25 minutes (range 12 to 50 minutes) in August, 23 minutes (range 13 to 50 minutes) in September, and 16 minutes (range 6 to 30 minutes) in October. Greatest day-to-day variation in duration of flight activity occurred early in the season when the number of birds in the area was relatively small. Despite high October populations, flights were extremely concentrated in time, particularly morning flights. Evening flights came to the roost in smaller groups and over a longer period than were recorded for morning flights from the roost. Martin (1957) noted a similar difference in Indiana. Morning flights usually left almost en masse in October when greatest numbers of Wood Ducks were present. This made estimation of numbers difficult, especially because the birds left well before sunrise when visibility was still poor.

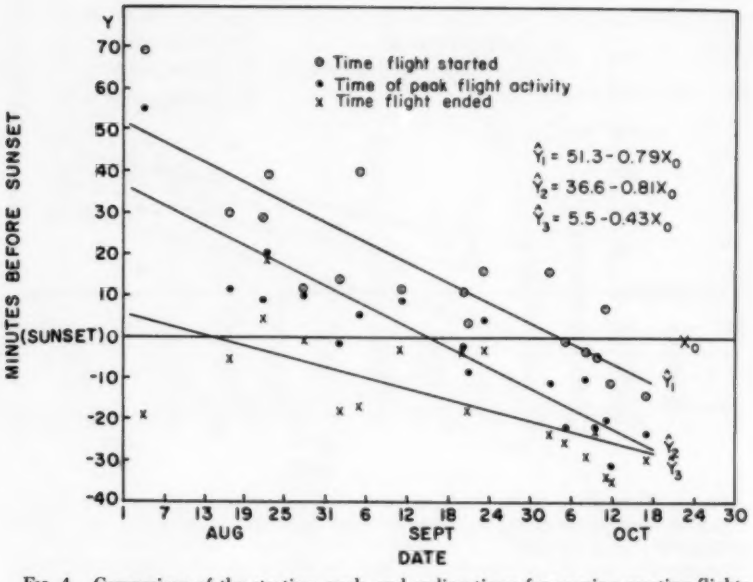


FIG. 4. Comparison of the starting, peak, and ending times for evening roosting flights of Wood Ducks at Muskrat Lake in 1958. The linear regression of time on date of count is plotted for each.

DISCUSSION

Knowledge of seasonal changes in Wood Duck roosting flight habits may be useful in evaluating Wood Duck roosting flight counts as possible indexes of abundances. In early fall, evening roosting flights began about 45 minutes (±15 minutes) before sunset with little activity after sunset. Counts made during this period of time and ending shortly after sunset will include most Wood Ducks in a roosting flight. Early fall morning counts should begin about 30 minutes before sunrise and continue until about 15 minutes after sunrise. To be reliable, the counts must be made from suitable observation points and under weather conditions conducive to good visibility. Arrival of waves of new migrants may spread flights over longer periods with more apparently random flight than usual.

Well-defined feeding flights occur prior to evening roosting flights in some areas. In such areas roosting flight habits may be somewhat different from those observed in this study where large-scale evening feeding flights were not noted. Additional research effort on other areas should contribute useful information on this point.

It is important to keep in mind that fall Wood Duck populations are mobile and changing, so the observer must study the flights carefully and be ready to modify his work schedules as conditions seem to warrant.

The peak population of Wood Ducks (300) at Muskrat Lake occurred during the second week in November.

Summary

Wood Ducks congregated nightly at roosts in late summer and fall. Both morning and evening roosting flights changed gradually, occurring nearer the hours of darkness and over shorter periods of time as the fall season advanced. Major morning roosting flight activity early in the fall occurred during a period of about 45 minutes, usually ending by 15 minutes after sunrise. Early fall evening roosting flight activity occurred primarily during the 50-minute period ending shortly after sunset. Late season (October and November) roosting flight activity took place before sunrise and after sunset.

Literature Cited

Hester, F. E.
1955 MS The Wood Duck in east-central North Carolina. Unpub. M.S. thesis. N. Car. St. Coll. Library, Raleigh.

Martin, D. N.
1957 MS Wood Duck autumn flight activity in relation to sunrise and sunset. (Paper presented at 19th Midw. Wildl. Conf., Milwaukee, Wis.) Ind. Div. of Fish and Game, Indianapolis.

Martin, E. M.
1959 MS River float and roosting flight counts as indices to numbers of Wood Ducks. Unpub. M.S. thesis. Iowa St. Univ. Library, Ames.

Smith, M. M.
1958 MS Louisiana Wood Duck roost counts. La. Wildl. and Fish. Comm., New Orleans.

Snedecor, G. W.
1956 Statistical methods. 5th ed. Iowa St. Coll. Press, Ames. 534 pp.

Department of Zoology and Entomology, Iowa State University, Ames, Iowa, January 19, 1960 (originally submitted September 13, 1959)

LAYSAN TEAL IN CAPTIVITY

BY S. DILLON RIPLEY

In August, 1958, I received two pairs of Laysan Teal (*Anas laysanensis*) from Hawaii through the courtesy of the Bureau of Sport Fisheries and Wildlife, Department of the Interior. I am most grateful to Mr. Ross Leffler, Assistant Secretary of the Interior, and Mr. Daniel Janzen, Director of the Bureau, for their cooperative interest in the project for bringing some Laysan Teal into captivity for observation and study, and to Mr. Paul Breese, Director of the Honolulu Zoo, for facilities extended through his interest and enthusiasm, as well as to the authorities of the Territorial Board of Agriculture and Forestry of Hawaii, especially Mr. Richard Warner of that staff who actually participated in the capture of a number of these curious birds.

Laysan Teal have had a varied history since their discovery by Palmer, Rothschild's collector, in 1891. Laysan Island is about two miles long and one mile wide with a small brackish pond in the center, and lies in the Leeward chain of the Hawaiian Archipelago, about 800 miles northwest of Honolulu. From a population of about a hundred in 1902, the ducks were nearly extinct in 1911 and 1912, no more than seven being recorded in the latter year. Their numbers had crept up to 20 in 1923 when Dr. Alexander Wetmore visited the island, taking six specimens for the National Museum collection at the time.

The most direct prejudicial influence on the Laysan Teal was perhaps the introduction of rabbits on the island about 1903. The effects of this introduction were disastrous as the vegetation was largely destroyed and three bird species became extinct on the island, the Laysan Island Rail (*Porzanula palmeri*), the Laysan Millerbird (*Acrocephalus familiaris familiaris*), and the Laysan Honeyeater (*Himatione sanguinea freethi*).

At a later time, the date is not clear, the rabbits on Laysan were exterminated with the result that the vegetation has now been restored and there is a prolific growth of grasses, portulaca, casuarina, solander and a few coconut palms. Insects are now abundant although presumably many of the endemic species are extinct along with a host of endemic plants. From the observations of Warner (in litt.) it appears that the present population of teal is largely insectivorous. Currently the population has jumped from 33 in 1950 to over 300 in 1956, and to over 500 in 1958. Such a violent oscillation in numbers makes the taking of precautionary measures doubly advisable from an ecological point of view. A downward oscillation could as easily be produced as an upward one, and it is now a project of study to see if an introduction of these teal might be made to a neighboring island in the chain such as Lisiansky, and also if a buffer population could not be established in captivity.

In connection with the recent observations of the birds by Warner and others two interesting habits were noted. Teal were never seen on the water. They were always in the grass and low bushes, and appeared to be exclusively insectivorous. Two speculations occur here. Is it possible that these birds can absorb metabolic water from their insect diet? In addition is it possible that the teal, once the rabbits have been eliminated, are to some extent taking over the niche vacated by the loss of the rail? Field studies might be most rewarding in this connection.

Captive Birds

In 1943 I speculated that this teal would never be kept in captivity and might indeed be already extinct. How much I enjoyed then seeing these four birds loaned to me by the Bureau of Sport Fisheries and Wildlife arrive at Litchfield. In the first few months we catered to their diet, offering them fresh turf, flies, insect food seined from ponds, and fresh lettuce, as well as pellets. Later the birds adjusted to artificial food readily, and were liberated on two small ponds in early April.

No striking display activities were noted. This was perhaps due to lack of personal opportunity for observation rather than anything else. Head-stretching or pumping was noted, head-up, tail-up (once), chasing or nod-swimming with head low on the water, and a very well-defined female threat display. The threat display was addressed to another larger duck, and in general aggression is characteristic of these birds. Fighting was observed with Hawaiian Ducks (*Anas platyrhynchos wyvilliana*), and the pairs had to be separated to avoid any possible risk. Threat display was accompanied by a low *gaeck gaeck*, similar to that of the Mallard (*Anas platyrhynchos*). On one occasion a typical pumping movement similar to those described by Lorenz for other species of *Anas* (1951, 1952) was followed by copulation.

One female (F. and W. band No. 535-15283) nested twice, both times laying five eggs. A female that nested at the Wildfowl Trust last spring also laid five eggs. Perhaps this is normal for a clutch. The female, while sitting on the nest, concealed in a dense clump of alder, uttered her threat calls when human beings, and presumably other ducks, approached the nest. The eggs were very large for the size of the bird. One which has been preserved measured 58.5 × 40.2 mm., larger than the measurement given by Delacour (1956) and equalling the size of a Mallard's egg, a typical one of which measures 60 × 40 mm.

Four ducklings hatched from the first nest on July 8, 1959. The second clutch of four hatched on August 13 and 14. The downy plumage of these birds (Fig. 1) differs significantly from the plate by Peter Scott in Delacour's

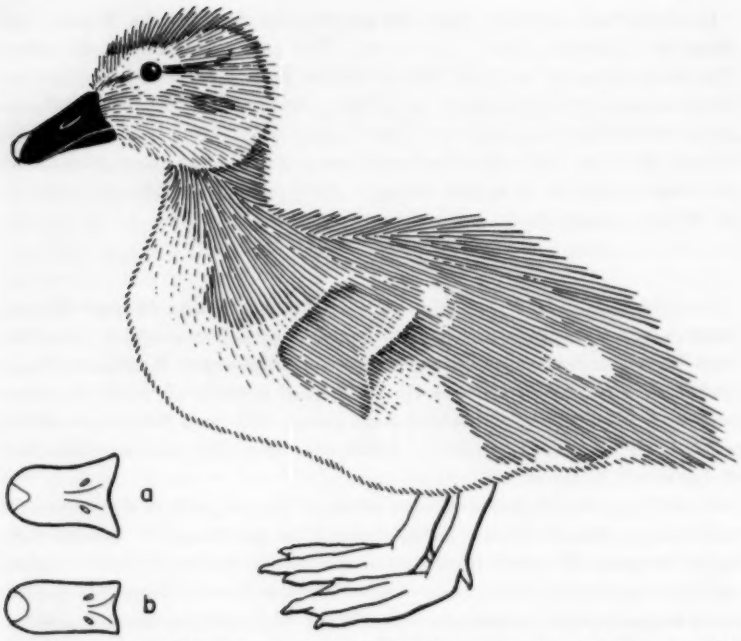


FIG. 1. Downy duckling Laysan Teal showing plumage pattern and outlines of bill shapes in distal view; a. Laysan Teal day-old, b. Mallard day-old.

volume (1956). The humeral and tail spots are reduced, the dark line through the eye is only indicated anterior to the eye, and the dark cap does not reach anteriorly across the forehead to the bill, but is separated. The forehead is colored like the cheeks. The color of these ducklings was dull yellowish brown above and dull yellowish below. The cheeks and forehead were brownish yellow. The legs were dull greenish yellow anteriorly, and dull greenish brown posteriorly. The most noticeable characteristic of these ducklings was the broad spatulate bill, very broad for a duckling, colored brown with a pinkish tip.

As the ducklings have grown, the spatulate effect has continued. The impression was that these were indeed baby Cape Shovelers (*Anas smithi*), or Cinammon Teal (*Anas cyanoptera*). The bill is far more pronouncedly spatulate than the Hawaiian Duck or, of course, the Mallard. By three weeks, flank feathers had appeared, characteristically coarsely patterned as in the adult Laysan Teal, chocolate brown in color with broad dark brown edges. By November all these young birds are in apparently adult plumage with the

exception that the white around the eye is confined to a narrow ring, no more than 2 mm. in width. In addition, two of the young males have a greenish iridescent suffusion to the feathers of the head and upper neck.

Conclusion

The size of the eggs of the Laysan Teal, and the size of the ducklings are both extraordinarily large in proportion to the adult birds which are the size of teal. There is apparently an allometric rate of growth which differs markedly from the Mallard, involving not only initial size of the egg and young, but also body proportions. There must be adaptive value for this isolated, reef-inhabiting duck in having an egg and duckling at hatching age so large in proportion to the adult. In addition, the bill in shape and size suggests an adaptation to insectivorous diet.

Delacour and Mayr (1945) have emphasized the conservative nature and taxonomic value of downy plumages of waterfowl. On the basis of the rather striking downy plumage differences, proportionate growth differences, bill structure, small size and coarse plumage, I would be inclined to keep *Anas laysanensis* as a monotypic species within the Mallard, *platyrhynchos* superspecies.

Literature Cited

Delacour, J.
1956 The waterfowl of the world. Volume Two. Country Life, London.
Delacour, J., and E. Mayr
1945 The family Anatidae. *Wilson Bull.*, 57:3–55.
Lorenz, K.
1951 Comparative studies on the behavior of the Anatidae. *Avicultural Magazine*, 57:157 *et seq.*
Ripley, S. D.
1943 Pacific waterfowl. *Avicultural Magazine*, 7:68.

Peabody Museum of Natural History, Yale University, New Haven, Connecticut, August 24, 1959

HEART WEIGHTS OF NORTH AMERICAN CROWS AND RAVENS

BY DAVID W. JOHNSTON AND FRANCIS S. L. WILLIAMSON

In recent years when so much attention has been focussed on human cardiovascular problems and their amelioration, the study of cardiophysiology in mammals has contributed much toward our understanding of these problems, but basic research in other vertebrates has lagged far behind in this respect. Feral birds, for example, have scarcely been examined since the pioneer investigations on heart rate by Odum (1941). Some revival of interest in this field is indicated by the recent reports of Hartman (1954) and others whose studies have centered on anatomical relationships between avian heart weight and such variables as body weight and altitude. From a perusal of these papers, it is evident that many more data are needed from feral birds before the physiological questions can be answered. Nonetheless, it has been known for many years that the largest birds (in terms of body weight) have the smallest or lightest hearts, relative to body weight, and vice versa. In the Passeriformes, the Common Raven (*Corvus corax*) is evidently the largest living representative, not only in terms of body weight but also in linear measurements. Presumably, ravens and their close relatives, the crows, should have relatively small hearts or heart/body weight ratios.

The present report was undertaken to demonstrate the heart/body ratios of these large passerines. Included in our study are data for 13 ravens, 9 Fish Crows (*Corvus ossifragus*), and 43 Common Crows (*C. brachyrhynchos*).

Methods

The 65 specimens discussed in this paper were taken in late spring or summer, thus representing local breeding populations. Wintering, migrating, or molting individuals have been excluded; our data for birds in these conditions may be used for later considerations. All were collected between 1955 and 1959 at or near sea level. The Fish Crows came from southern Georgia, principally along the coast. Common Crow specimens were taken in the Macon, Georgia, area, and in Washington, west of the Cascade Range from localities ranging from the San Juan Islands south to the Olympia area and the Olympic Peninsula. The ravens were collected at Anchorage, Alaska, except for two individuals from the Olympic Peninsula of Washington. Taxonomically, according to the A. O. U. Check-list (1957:377–379), the Common Crows of Georgia represent the subspecies *paulus*, and the Washington birds belong to a separate species *caurinus*. The ravens from Alaska represent the subspecies *principalis* and those from western Washington, *sinuatus*. Evidence has been amassed by Johnston (in press), however, to show that *C. b. paulus* is synony-

mous with *C. b. brachyrhynchos*, and that *C. caurinus* is simply a well-marked subspecies of *C. brachyrhynchos*.

Weights were obtained in essentially the same method utilized by Norris and Williamson (1955). Birds fresh from the field were weighed on a double-beam balance to the nearest 0.1 gram, and the heart was preserved in 10 per cent formalin. At a later time each heart was thoroughly dried on filter paper, the major vessels were trimmed off close to the organ, and clotted blood was carefully removed before the heart was weighed on a triple-beam balance to the nearest 0.01 gram. Even though Hartman (1954, 1955) weighed only fresh hearts, in our study weights of the formalin-preserved hearts were considered to be as accurate as fresh weights might be, especially since Norris and Williamson (1955:79) demonstrated an insignificant weight difference between the same heart weighed fresh as compared with a later weight taken after formalin-preservation.

Results

Complete data on body and heart weights are given in Table 1 because there are so few extant reliable weights of these birds. Many collectors, preparators, and taxonomists have failed to recognize the two distinctive age groups (first-year and adult) of these and some other corvids, so that many specimens labelled "adult" are in fact first-year birds, and vice versa. It is essential that these differences be recognized so that data obtained from individual specimens might be treated according to the proper age group; otherwise, questionable or erroneous conclusions might be reached. Hartman (1955:231), for example, did not distinguish age groups for the various corvids utilized for his heart ratios, and one would suspect that the data presented there are not precisely accurate. For this reason, plus the fact that he combined data for the two sexes, his data might not be strictly comparable to those given in Table 1. Nonetheless, his figure of 1.20 (heart weight/body weight) for a male of *brachyrhynchos* from Ohio is in general agreement with the average of 1.23 for eight adult males from Georgia. The average of 10 specimens from Florida (0.98) given by Hartman suggests that Common Crows of that region are large birds with relatively small hearts.

Hartman (1955:223 *et sqq.*) did not find any significant sex differences in heart ratios for the many species given in his compilation, but his samples were usually less than 10. Whether or not our data presented for the two sexes can be considered as "significantly different" is a debatable point because these are also small samples. In the largest comparable sample (*brachyrhynchos* from Washington), average weights do indicate some degree of sex difference in the heart ratios (1.12 for males and 1.07 for females), but these differences are not significant at the 5 per cent level. Norris and Williamson,

TABLE 1
BODY AND HEART WEIGHTS OF CROWS AND RAVENS

	Number	Body Weight	Heart Weight	Ht. wt./body wt.
Corvus ossifragus				
adult male	1	310	2.70	1.15
first-year male	2	292.4* (268.5–316.3)	2.43 (2.36–2.50)	1.26 (1.07–1.34)
adult female	5	283.6 (268.6–294.0)	2.59 (2.17–3.00)	1.11 (0.96–1.34)
first-year female	1	300.5	2.24	1.34
C. brachyrhynchos				
Georgia				
adult male	8	447.8 (415.5–509.0)	3.68 (2.77–4.43)	1.23 (1.09–1.52)
adult female	6	403.3 (372.6–444.3)	3.27 (2.95–3.78)	1.24 (1.10–1.34)
first-year female	1	414.0	3.06	1.35
Washington				
adult male	19	415.2 (388.8–486.3)	3.74 (3.00–5.11)	1.12 (0.78–1.33)
adult female	8	367.9 (314.6–421.2)	3.46 (3.04–3.86)	1.07 (0.86–1.19)
first-year female	1	348.9	3.04	0.87
C. corax				
Alaska				
adult male	2	1593.3 (1540.6–1646.0)	14.29 (12.03–16.55)	0.90 (0.73–1.07)
first-year male	2	1355.1 (1305.0–1405.2)	13.91 (13.67–14.14)	1.03 (1.01–1.05)
adult female	1	1233.0	11.77	0.95
first-year female	6	1169.0 (1008.3–1294.0)	12.66 (11.03–15.69)	1.08 (0.98–1.29)
Washington				
adult male	1	1016.7	10.52	1.03
first-year female	1	969.3	11.18	1.15

* Mean weight in grams followed by extremes in parentheses.

however, reported (1955:81) that ". . . both *Cyanocitta stelleri* and certain fringillid species show higher heart ratios in males than in females. (This is likewise true of *Aphelocoma coerulescens*. . . ." Since their samples included 24 *Cyanocitta* and 84 *Aphelocoma*, it is possible that larger samples of *Corvus* might reveal sex differences of a significant nature. For other passerines Williamson and Norris (1958:91) presented additional data indicating some sex differences in heart ratios.

The values of 0.78 (*brachyrhynchos* from Washington) and 0.73 (*corax* from Alaska) represent the smallest heart ratios known for any of the Corvidae. This particular raven was the heaviest (1646.0 grams) of all those examined here, and had the largest linear measurements (wing—441 mm., tail—242, tarsus—68.9, bill from nostril—53.9, depth of bill—28.4). On the other hand, the adult male raven from Washington (heart ratio = 1.03) had the following measurements: weight—1016.7 grams, wing—380 mm., tail—212, tarsus—65.2, bill from nostril—48.6, depth of bill—26.0. The differences in

these weights and linear measurements compare favorably with the averages given by Ridgway (1904:259–262) for the subspecies *principalis* and *sinuatus*, respectively. Body size, however, is obviously not the only factor to be considered, because in smaller corvids (*Cyanocitta*), heart ratios as small as 0.80 have been reported by Norris and Williamson (1955:81). There are undoubtedly some complicating variables, such as activity and basal metabolism which influence these ratios in addition to sex, age, climate, and altitude.

The data in Table 1 also suggest that first-year crows and ravens have larger hearts than do adults of the comparable sex. As a matter of fact, with the exception of one *brachyrhynchos* from Washington, in these three species, values for first-year birds are uniformly greater than those for adults of the same sex. These data are of further interest since Hartman (1955:224) reported either no differences between age groups or that young birds had smaller hearts than adults. In these corvids, however, it must be remembered that maturation is more protracted than that found in the usual passerine types, the latter attaining essentially "mature" or "adult" size, proportions, and coloration in a year or less. Our data for *Corvus* substantiate Hartman's statement (1955:237) that "the age at which heart size attains adult magnitude appears to differ among species."

Finally, a possible factor to be considered in heart weights is that of fat deposits. As yet, there is no clear evidence to indicate that this is a significant factor in birds of the size considered here, for major fat deposits in subcutaneous and abdominal areas are likely proportional to those around the heart. Although excessively "fat" birds were not examined in this study, light or moderate fat deposits were sometimes noted upon dissection of abdominal areas, but the same birds had some fatty deposits around the heart. Thus, it appeared grossly that additional weight of a heart attributed to fatty deposits would be proportional to additional body weight as the result of subcutaneous and abdominal deposits of fat. It might be argued that lean body and heart weights would be more accurate, but this is not necessarily true since *entirely* fat-free birds would be exceptional in nature anyhow. In fact, Odum and Perkinson (1951:220) showed that heart lipids in the White-throated Sparrow (*Zonotrichia albicollis*) increased in premigratory individuals along with total body lipids, though not proportionately.

Summary

Body weights, heart weights, and heart weight/body weight ratios are given for 65 North American crows and ravens. The samples included two species of crows and two subspecies of ravens, the latter being the largest passerine birds. Data were presented for both adults and first-year birds of both sexes when available.

The adult Common Ravens from Alaska proved to be the largest birds examined, and had the smallest heart ratios (even among extant data for other corvids), averaging 0.90 for males and 0.95 for a single female. Adult Common Crows from Georgia had average heart ratios of 1.23 for males and 1.24 for females, whereas those from western Washington were 1.12 and 1.07, respectively. Adult Fish Crows tended to have heart ratios somewhat intermediate between those of the Common Ravens and Common Crows (1.15 for a male and 1.11, an average of five females).

In these three species males have heart ratios sometimes greater than, sometimes less than, those of females, but these differences do not appear to be significant.

Comparisons between heart ratios of adults and those of first-year birds of the same sex showed that adults of these three species have smaller hearts than the first-year birds. The reason for this difference is unknown at present.

Whether fat deposits are significant as variables in relative heart size seems to be purely speculative at the present time, but there was no conclusive evidence from these studies that even a moderately fat crow or raven had a significantly different heart ratio from that of a lean individual.

Literature Cited

A. O. U. Check-list Committee
1957 Check-list of North American birds (5th ed.). American Ornithologists' Union, Baltimore, xiii + 691 pp.

Hartman, F. A.
1954 Cardiac and pectoral muscles of Trochilids. *Auk*, 71:467–469.
1955 Heart weight in birds. *Condor*, 57:221–238.

Norris, R. A., and F. S. L. Williamson
1955 Variation in relative heart size of certain passerines with increase in altitude. *Wilson Bull.*, 67:78–83.

Odum, E. P.
1941 Variations in the heart rate of birds: a study in physiological ecology. *Ecol. Monogr.*, 3:299–326.

Odum, E. P., and J. D. Perkinson, Jr.
1951 Relation of lipid metabolism to migration in birds: seasonal variation in body lipids of the migratory White-throated Sparrow. *Physiol. Zool.*, 24:216–230.

Ridgway, R.
1904 The birds of North and Middle America. Part III. *U. S. Nat. Mus. Bull.*, 50: 1–801.

Williamson, F. S. L., and R. A. Norris
1958 Data on relative heart size of the Warbling Vireo and other passerines from high altitude. *Wilson Bull.*, 70:90–91.

Department of Biology, Wake Forest College, Winston-Salem, North Carolina; and Arctic Health Research Center, United States Public Health Service, Anchorage, Alaska, November 9, 1959

EVALUATION OF AN AURAL RECORD OF NOCTURNAL MIGRATION

BY RICHARD R. GRABER AND WILLIAM W. COCHRAN

In an earlier paper (1959), we described a technique for detecting and automatically recording the calls of nocturnal migrants.

During the fall (August-October) of 1957, the spring (April-May) and fall of 1958, and the spring of 1959, we used this technique on 175 nights to collect data on bird migration in Champaign County, Illinois.

In the present paper we have placed emphasis on presentation of these audio data rather than on their interpretation. We have, however, attempted to determine how well the data compared with other types of observations, and to consider especially the aural record in relation to weather at Champaign.

Acknowledgments

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Methods

For details on the principal method of study we refer the reader to our technique paper (1959). Here we need only summarize. Amplified calls of nocturnal migrants were recorded nightly on tape. The recording was controlled by an automatic timer which sampled 1½ minutes out of each 10 minutes during the night, providing a 1½-hour-long tape representing 10 hours. Tapes were audited daily and the time of calling of migrants and the number of each type of call recorded on a data sheet. We noted species names only when we felt certain of the identity of the call. Otherwise the phonetics for the call was recorded and, when possible, a general identification, such as: "warbler, possibly *Oporornis*."

In computing "flight-call densities" we have, for simplicity, used the area pattern shown in Graber and Cochran (1959:228), though the pattern actually varies somewhat with the sound source.

We have expressed flight-call densities as number of calls per mile, per hour, or per night, following Lowery's (1951) work on flight density. Unless otherwise stated, when we refer to a relative volume of migration (heavy or light), we mean migration volume as indicated by our records of calling of nocturnal migrants. We recognize the difference between high volume of

migration and high incidence of calling by nocturnal migrants. Mass flights would go undetected by our system if migrants remained silent.

To obtain data to compare with the audio record, Graber (1) made daily censuses of migrants in local woodlands during at least part of each migration season, (2) checked a local television tower daily and collected specimen data of kills, and (3) made lunar observations of migration on two nights in the spring of 1959.

Our audio station was purposely located in open country and the nearest woodlands were approximately 8 miles away, near Urbana, Illinois. In censusing migrants this same area and the same census route were used daily. The route through open park lands, dense shrub thickets and mature woodland was about 1 mile long and required about one hour (0600–0700) to cover. Only individuals of species known to be nocturnal migrants were counted. Census figures were recorded on field data cards and the day-to-day change in the migrant population was graphed to facilitate comparison with the audio record. The graph was based on a point system in which each apparent departure or arrival of a species in the area, and each obvious change in numbers of individuals of a species, counted a unit on the graph. A new species arrival was counted only when at least two individuals were seen.

We strove for a continuous aural record each season, but equipment failure or power failure caused some gaps in the record. We were still experimenting in the fall of 1957, and the record for that season is particularly sketchy, providing data for only 38 nights in the period from August 17 to October 14. The record for fall, 1958, was uninterrupted and ran from September 7 to October 24. The spring records ran from April 13 to June 1 (1958), and from April 8 to May 30 (1959). Each spring record contained lapses of six nights (not consecutive).

All figures referring to time of day in this paper represent Central Standard Time.

Mass Migrations—Timing and Weather at Champaign

Though some migrants were heard on 85–89 per cent of the nights recorded, most of the volume of migration (67–88 per cent) passed on a relatively few nights (23–42 per cent of nights recorded). Figs. 1–2 and Table 1 present data on these mass migrations.

A relationship between mass migration and frontal systems has been recognized at least since the time of Cooke (1888), and a number of authors have reviewed the subject. Most of the mass movements of birds detected in this study were associated with frontal systems—warm fronts in spring and cold fronts in fall.

This association was apparent in the coincidence of timing between the movement of the front and the birds (Figs. 1–2 and Table 2). In fall, 1958,

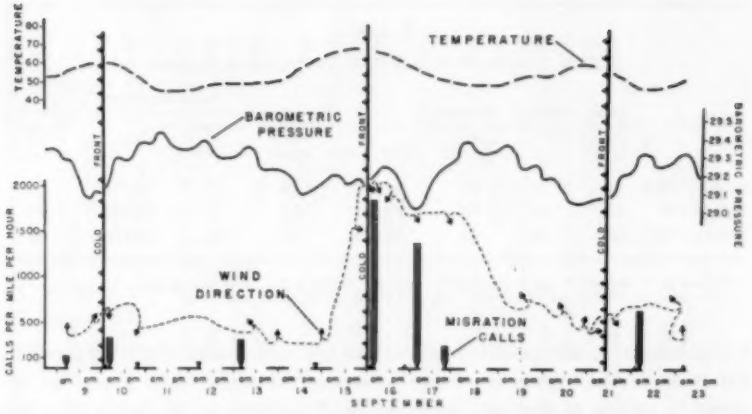


FIG. 1. Timing of nocturnal migration with frontal passage and changes in minimum nightly temperature (in °F.), barometric pressure (in inches) and wind direction at Champaign, Illinois, in September, 1958. Bar graph shows volume of migration as indicated by calling of nocturnal migrants. Black base line indicates night hours, and time markers indicate 12 midnight and 12 noon. Arrival time of first migrants is shown by black apexes.

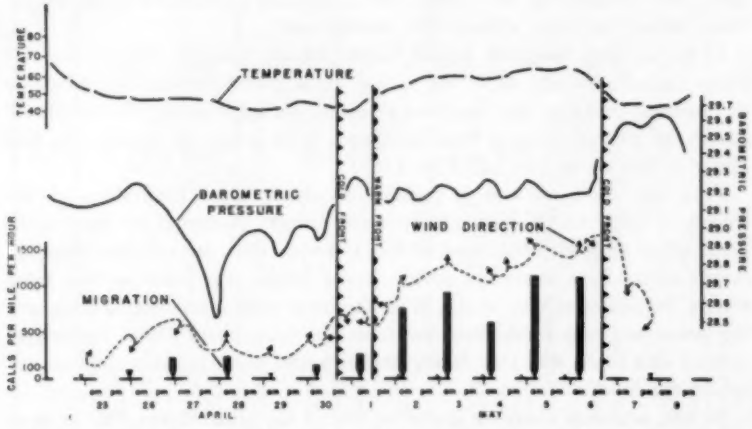


FIG. 2. Timing of nocturnal migration with frontal passage and changes in minimum nightly temperature (in °F.), barometric pressure (in inches), and wind direction at Champaign, Illinois, in spring, 1959. Black base line indicates night hours, and time markers indicate 12 midnight and 12 noon. Arrival time of first migrants is shown by black apexes.

TABLE 1

MASS MIGRATION IN RELATION TO SEASONAL VOLUME

Season	Total number of nights recorded	Number of nights with migration	Per cent of nights with migration	Total volume of migration[1]	Mass Migration			
					Number of nights	Per cent of nights[2]	Volume	Per cent of total volume
Spring, 1958	44	39	89	34,615	9	23	23,270	67
Fall, 1958	47	40	85	59,620	14	35	52,560	88
Spring, 1959	46	40	87	90,920	17	42	78,145	86

[1] Volume of migration as indicated by calls of migrants per mile per season.
[2] Per cent of nights on which any migration was recorded.

heavy migration accompanied each of the six cold fronts which occurred in the study period. When the fronts passed in the night (four times) an increase in calling of migrants began within 20 minutes to two hours after the passage. Two of the cold fronts passed Champaign in the daytime—one at 1200, with the first migrants coming 12 hours later; and one at 1700, with migrants following in five hours.

The greater lag between migrants and fronts which pass in the daytime (versus night) reflects the fact that migration ceases during the day. Frontal speeds varied between 5–25 mph, and averaged about 15. With their own speed plus the speed of the frontal winds, migrants could not consistently remain behind the front without the daytime rest.

In spring, also, migrants lagged behind frontal passage. During the two years studied virtually all of the spring warm fronts passed Champaign in the daytime. Because day length is longer in spring than in fall, one would expect the interval between front and birds to be longer in spring also, and thus our data show it to be (Figs. 1–2).

From the audio data it is possible to obtain some impression of the frequency with which migrants overtake fronts. Assuming a base flight speed of 20 mph for birds, and adding tail-wind data, we calculate that migrants would have overtaken spring warm fronts only once in four mass flights. In this case, May 16–17, 1958, the front's speed was only 5 mph, and the fastest migrants would have overtaken the front about 0300. The migration on this night was very heavy and migrants were possibly "piling up" behind the front.

In fall, migrants overtook fronts in five of six mass flights, but in most cases the closing of birds with fronts would have occurred between 0400 and 0500, i.e., at about the time for the night's migration to end. Consistently the pre-dawn peaks in calling came earlier on mornings when migrants were overtaking the fronts, and the time of the peak in calling appeared to correlate

TABLE 2

MAJOR MASS MIGRATIONS AND FRONTAL SYSTEMS AT CHAMPAIGN, ILLINOIS, IN SPRING

Date	Front	From	Wind change		Speed (mph)	Arrival[1] time of front	Arrival[2] time of migrants	Difference	Volume[3] of migration
			From	To					
May, 1958									
2– 3	Warm	S	NE	S	15	1100– 2	0200– 3	—15:00	1775
16–17	Warm	S	NE	SE	5	1000–16	2300–16	—13:00	6400
17–18	Front stationary C. Illinois (24 hours) Continues S–SW; Migration continues, but slowing								2625
21–22	Warm	S	NW	S	20	1300–21	2100–21	— 8:00	4900
May, 1959									
1– 2	Warm	SW	NW	SW	12	1300– 1	0230– 2	—13:30	7700
2– 6	Front moves to N. Wisconsin (12 hours) Continues S–SE; Heavy migration continues								9050/night
15–16	None		NW Calm–SW			1300–15	0100–16	—12:00	930
16–18			Continues SW–SE			Heavy migration continues			5885/night
18–19	Warm	S	Continues S–SE		15–20	0030–19, Heavy migration continues			3935
19–22	Front moves to N. Wisconsin (12 hours) Continues S–SE; Heavy migration continues								3780/night
September, 1958									
9–10	Cold	NNW	W	N	20–25	0240–10	0300–10	— 0:20	3860
12–13	None		NE	Calm		1600–12	0400–13	—12:00	3100
15–16	Cold	NW	SW	N	5	0130–16	0330–16	— 2:00	12,900
16–18	Front moves to S. Illinois (12 hours) Continues N–NW; Heavy migration continues								6290/night
21–22	Cold	NW	SW	NW	17	1200–21	0030–22	—12:30	6700
25–26	Cold	NW	SW	NW	16	1700–25	2200–25	— 5:00	3100
26–27	Front moves to S. Illinois (12 hours) Continues NW; Migration continues, but slowing								1660
October, 1958									
4– 5	Cold	NW	SW	N	18	0030– 5	0230– 5	— 2:00	1600
16–17	Cold	NNW	SW	NW	10	0300–17	0200–17	1:00	1700

[1] Hour and date of arrival of front.
[2] Hour and date of the start of a peak in migration.
[3] Volume of migration in terms of bird calls per mile per night.

with the time of the closing of the gap between birds and fronts, i.e., when the closure occurred later, the peak in calling also occurred later.

Interestingly, on the night of the tower kills in the falls of 1957 and 1958, migrants were pressing the front especially closely, and on the night of the larger kill (1957) birds overtook the front earlier in the night. This is discussed later with the tower-kill data.

In only one instance did a large number of migrants reach Champaign in advance of a front. On October 16–17, 1958, at 0200 the first migrants were heard one hour in advance of an oncoming slowly moving cold front. This shows that migrants will, at times, overtake and pass the front, but in *all* observed cases of mass migration the vast majority of birds trailed the front.

In September, cold fronts which pass through Champaign almost invariably come from the west-northwest, originating on the northwest Pacific coast, and moving eastward to the central Dakotas and Minnesota. In this area (Dakota-Minnesota) the fronts turn decidedly to the southeast and pass ultimately off the Atlantic coast from east-southeastern United States.

In reaching Illinois these fronts sweep an area 2000 miles long and several hundreds of miles wide in northern United States and southern Canada.

Probably, birds from the Pacific northwest which generally represent a different fauna than that found in Illinois do not follow the front across the continent. However, certain species, such as Swainson's Thrush (*Hylocichla ustulata*), could conceivably come to Illinois from as far as British Columbia behind a front.

In September, the species of migrants which occur in the Champaign area in greatest abundance are probably the Swainson's Thrush, Ovenbird (*Seiurus aurocapillus*), American Redstart (*Setophaga ruticilla*), Tennessee Warbler (*Vermivora peregrina*), Magnolia Warbler (*Dendroica magnolia*), and Bay-breasted Warbler (*Dendroica castanea*). All of these have large areas of breeding range which lie in the path of the cold fronts. On the other hand, neither the Veery (*Hylocichla fuscescens*) nor the Hermit Thrush (*Hylocichla guttata*) is *abundant* here in migration, yet both species have large portions of their breeding range in the regions covered by the cold fronts. Conversely, the Gray-cheeked Thrush (*Hylocichla minima*) is a common September migrant here, yet most of this species' breeding range lies north of the frontal sweep. We have no way of knowing how far migrants may follow a front, or, indeed, if they actually follow the frontal path. The aural data suggest this possibility, however.

Despite the similarity which different fronts show in their direction of movement and area of coverage, the volume of migration which follows different fronts is highly variable. In fall the volume of a particular mass movement of birds appears to show a relationship to the time interval between

the end of a mass migration and the subsequent appearance of another cold front. As this interval increases the volume of migration also increases. The relationship was apparent in the fall data both in 1957 and 1958. In the fall of 1958 when the migration-cold front interval was only two days, the subsequent migration lasted only one night, and the volume was 300 calls per hour per mile. For other intervals the figures were: three days—one night of migration at a volume of 400 calls per hour per mile; for three and one-half days—one night, 600 calls; and for six days—three nights of migration, 1100 calls. This relationship can be explained by the reasonable assumptions that all migrants in an area do not develop the condition of "Zugunruhe" simultaneously, but with the passage of time, more and more birds come into the restless state. When a front passes, those migrants which exhibit nocturnal restlessness take flight. If a second front passes the region soon after the first, relatively few migrants will have attained the physiological state in which they are responsive to frontal passage. If the second front does not pass for several days, more migrants in the region will have become responsive. Thus, successive fronts "sweep" more and more birds southward. In spring this time-volume relationship was not evident.

Initiation of Flight

From the time-relationship between arrival of migrants and fronts, it is reasonable to assume that something about the passing of a front initiates the mass flights and that birds do not take wing until the front is past. Devlin (1954:94–95), from observations of the moon and in the field, considered the hour just before nightfall to be the critical time as far as the initiation of nocturnal migration was concerned in spring. He also suggested that migrants do not often take flight in the middle of the night. The fact that there is usually a lag between the time of frontal passage and the passing of the first migrants tends to support Devlin's view. Migrants taking off at night immediately after a front passed would ordinarily overtake it quickly, whereas migrants that start only at sundown or shortly after would be following the front by an interval of the number of hours between the time the front passed and sundown. Ball (1952:67–68) twice observed single birds taking flight in the early morning, but it is not known whether these observations represented mass migration.

Several times calls of nocturnal migrants were heard at Champaign shortly after sundown. The initial calling of migrants was also heard as late as 6½ hours after sundown following the passage of a front. Presumably, no matter what time of the day a front passes, nocturnal migrants will respond at sundown if the proper conditions (established by the front) still obtain.

Of the factors which the front may change, wind, temperature, and pres-

sure have been most commonly considered as being important to migration. Devlin (1954:95) believed that certain conditions of wind and temperature at sundown stimulated migration. Lowery (1951) showed that migrants generally moved with the wind, and indirect evidence presented by Bennett (1952) and several other authors supports his data. Bagg *et al.* (1950) presented an excellent discussion of migration in relation to barometric pressure and other meteorological phenomena.

It is worth while to consider the audio record in relation to such factors.

Migration and Surface Winds.—In fall, 1958, virtually all (93 per cent) of the calling of nocturnal migrants occurred during hours when surface winds were from the north-northwest (76 per cent) or calm (17 per cent), notwithstanding the fact that winds were predominantly southerly during the migration season (Figs. 3–5). Twenty-seven per cent of the night hours were calm.

In spring, 1958, most of the calling (72 per cent) occurred during hours when surface winds were south-southwest (54 per cent) or calm (18 per cent), though the winds were predominantly northerly. Twenty-three per cent of the night hours were calm. In spring, 1959, most of the calling (84 per

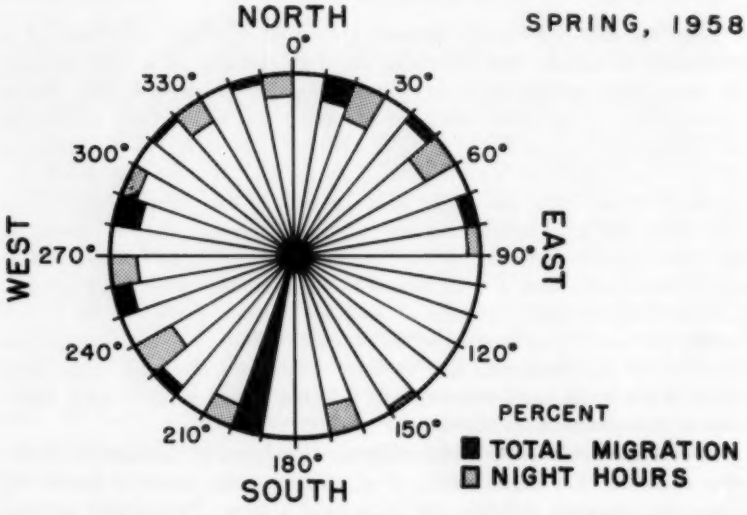
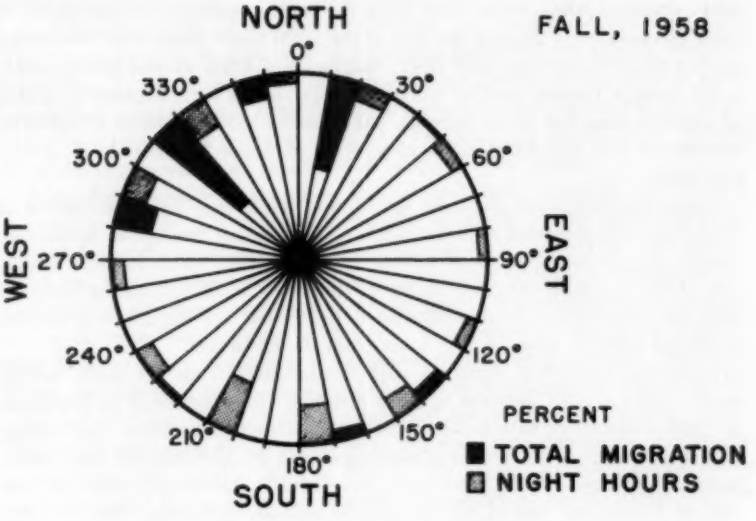
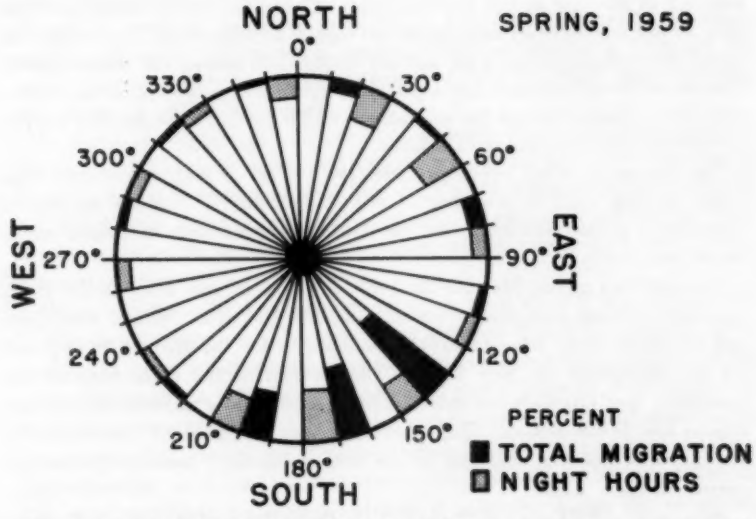


FIG. 3. Total seasonal volume of migration occurring with specific wind headings. Gray shading shows per cent of night hours during the season that wind held a specific heading. Black shading shows per cent of total migration occurring *with* the wind heading indicated.





FIGS. 4 (*above*) and 5 (*below*). Total seasonal volume of migration occurring with specific wind headings. For key, see Fig. 3.

cent) occurred when winds were from the south-southeast (58 per cent) or calm (26 per cent). Sixteen per cent of the night hours were calm. Maximum surface winds coinciding with heavy migration did not exceed 12–14 mph.

We have not made similiar calculations for winds aloft because of a lack of detailed data, but on an average, winds above 1500 feet show a clockwise rotation of 30° and an increase in velocity of about half the speed of surface winds.

Assuming northward flight in spring and southward flight in fall, it is clear that birds migrated with the winds. The question remains as to whether frontal passage was associated with a change in wind which favored migration. Figs. 1–3 show definitely in the affirmative. In fall, migration occurred when the wind shifted from southwest to northwest, and such a shift usually coincided with the passage of a front from the northwest.

In spring, migration occurred with a wind-shift from the north to the south. Often a 360° rotation in wind direction from southwest to northwest to north (coinciding with a cold front) to northeast to southeast (coinciding with a warm front) to south-southwest preceded by 48 hours the very heavy spring migrations. Such wind-shifts were usually associated with the passage of fronts, but one of the heaviest migrations in spring (May 17–18), 1959, did not coincide with a definite frontal system though a wind-shift west to south did occur. On this occasion southerly winds continued for at least six nights and so did the migration. The passage of a warm front on May 19 did not cause an increase in the volume of migration. The conditions which favored migration were already established before the front arrived. This observation indicates that a definite frontal system, per se, is not important to migration, though the conditions which favor migration are usually associated with the passage of a front.

The change in wind which precedes the arrival of migrants occurs relatively quickly, often in a matter of one or two hours. Velocity as well as direction is usually involved, and the change is one which an animal might detect very easily.

On only four nights, May 25–26, 1958, April 26–27 and May 22–24, 1959, was there notable migration apparently against the wind. Winds aloft (second standard level) were favorable (southerly) for the April date, but not for the migrations on May 22–24. The lateness of the dates suggests the possibility that migrants are more likely to move under unfavorable circumstances late in the season. This same view was expressed by Cooke (1888: 16–25), who believed that late in the season (spring) some migration occurred on every night.

Migration and Changes in Temperature, Humidity, and Pressure.—Changes in temperature, pressure, and humidity which accompany passage of a front

might also conceivably be detected by migrants.

In fall, most waves of migration coincided with periods of relatively high night temperatures, though with the 24-hour trend toward falling temperatures (Fig. 1). In spring, mass migrations came consistently in periods when temperatures were rising, often following a short period when night temperatures were lower than average (Fig. 2). The tendency for birds to migrate on warm nights was more pronounced in spring than in fall.

Daily fluctuation in temperature was so great in both spring and fall that it seemed unlikely that migration could be triggered by the subtle temperature changes which accompany a front, especially in view of the fact that at sundown, the presumed time of take-off, the temperature is usually falling steeply. Temperature and humidity are so closely interrelated that it is difficult to evaluate them separately. Humidity as indicated by dew-point temperature tends to follow the curve of minimum nightly temperatures. Dew-point is less variable than temperature, and changes in dew-point are usually subtle.

In fall, at least, no particular condition of temperature or humidity correlated with migration if the winds were adverse (note conditions during the period September 15–18, 1958, in Fig. 1). In spring, warming temperatures and increasing humidity so consistently accompany southerly winds that the factors, again, are difficult to evaluate separately.

At Champaign, the beginning of heavy migration usually accompanied rising barometric pressure in fall and falling pressure in spring (Figs. 1–2). Though it does not fluctuate so much as temperature, pressure is highly variable. However, the pressure changes which accompany a front are not usually extraordinary, so pressure change (at least by itself) seems unlikely as a factor to initiate migration.

In summary, the factors which most consistently precede or accompany the initial wave of birds in a mass migration are: in fall, wind direction change from southwest to northwest, relatively high night temperature but with falling trend, and rising barometric pressure; in spring, wind change from southwest to north to southeast to south, rising temperature, and falling barometric pressure.

Of these factors, the wind changes correlate most directly with fluctuations in volume of migration. The audio data indicate that it is the wind which probably exerts the dominant influence in initiating and halting a mass flight.

Once migration was initiated, it continued past a point of observation until the migrant swarm passed, if the proper conditions held. In fall, mass migration appeared to discontinue if surface winds became southerly. Cessation of fall migration, or at least of nocturnal calling, coincided also with relatively low night temperature and high barometric pressure, though not invariably.

In spring, migration was discontinued when winds switched from south-

TABLE 3

ANALYSIS OF MIGRATION AND CLOUD COVER

Tenths of cloud cover	Per cent of time with condition	Per cent of migration occurring
Fall, 1958		
0–5	67	44
6–9	13	9
10	20	47
Spring, 1958		
0–5	55	36
6–9	25	45
10	20	19
Spring, 1959		
0–5	30	39
6–9	20	27
10	50	34

erly to northerly. Again not invariably, such a change was accompanied by low night temperature and high pressure. Thus on May 2–6, 1959, heavy migration continued nightly with southerly winds until halted by a wind-shift (with a cold front) from the south to the north-northwest. This is an example of the situation described by Bagg *et al.* (1950:18) that in spring "pronounced movement will take place . . . through a given region during the interval between the passage of a warm front . . . and the subsequent arrival of a cold front."

Cloud Cover and Migration.—In view of the interesting work of Sauer (1958) and Bellrose (1958) on celestial orientation in birds, it is worth while to consider the audio record of migration in relation to cloud cover because opaque overcast could conceivably interfere with celestial orientation.

Tables 3 and 4 present data on migration and cloud cover. Table 3 indicates that migration is not particularly reduced on nights with opaque overcast. No consistent tendency is shown and the condition of overcast appears to be incidental to other factors as far as volume of migration is concerned.

Table 4 summarizes data on migration and opaque overcast in greater detail. On the nights of May 2–3 and September 15–17, 1958, and April 26–27 and May 17–18, 22–23, 1959, heavy migration coincided with complete overcast. Birds flying at elevations of a few hundred feet could not have seen the stars on those nights. In one case (September 15–17) opaque overcast lasted as long as 59 hours in the Champaign region, and in all of the cases mentioned the overcast was widespread, extending over several states. It is possible that in most cases birds could have been flying above

TABLE 4

MASS MIGRATIONS AND OVERCAST

Date	Hours	Volume	Period of continuous opaque cover		Lowest layer		Second layer		Third layer		Geographic extent of overcast
			Start	End	10ths	Altitude (feet)	10ths	Altitude (feet)	10ths	Altitude (feet)	
May, 1958											
2	2000–				1	800	6	1600	6	2300	Ill., S. Wisc., Ind.,
	2300	1775	2–1900	3–1900	6	700	4	1300	u[1]		Ohio, Ky., Tenn., Ark.,
3	0000–				10	500	u		u		Mo., Iowa, Minn.
	0500				6	900	4	1900	u		
September, 1958											
15	2000–				10	3800	u		u		Ill., S. Wisc., Mich.,
	2300	12890	15–0900	17–2000	5	u	3	1600	2	2300	Ind., E. Mo., E. Iowa
16	0000–				7	1200	3	4000	u		
	0500				8	400	2	800	u		
16	2000–				8	3500	10	8000	u		Ill., Wisc., Mich., Ind.,
	2300	10265			10	400	u		u		Ky., Tenn., Miss., N.
17	0100–										La., Ark., Mo., Iowa,
	0500				10	300	u		u		Minn.
April, 1959											
26	2000–										Ill., Wisc., Mich.,
	2300	1698	26–1100	27–0900	4	1300	6	2300	u		Ohio, Ind., Ky.,
27	0000–										Tenn., N. Ark., Mo.,
	0500				10	10000	u		u		Iowa, Minn.
May, 1959											
17	2000–				10	1200—	u		u		Ill., S. Ind., Ky., Tenn.,
	2300	7834	17–1100	18–0600	10	1600	u		u		Mo., SE Iowa
18	0000–				2	600—	8	2000			
	0500				2	800	8	2000	u		
22	2000–				10	600	u		u		Ill., Wisc., S. Mich.,
	2300	2112	22–0800	23–2200	10	400	u		u		Ohio, N. Ind., W. Ky.,
23	0000–				10	300					W. Tenn., Miss., La.,
	0500				10	300	u		u		E. Tex., Okla., Kans.,
											Ark., Mo., Iowa

[1] u=unknown

at least the lower cloud layers, but in all of the cases cited, migrants probably began their night's migration in Illinois under opaque overcast without having seen direct sun or other starlight for as many as 14 hours.

The importance of favorable wind conditions to migration has already been stressed. With only one exception (April 26–27, 1959) heavy migrations under overcast occurred with favorable winds. *This fact implies that migrants were able to identify wind direction without the stars for orientation.*

It is also conceivable that migrants fly at such times even though they are dis-oriented, but this seems unlikely in view of the frequency with which migration and overcast coincide.

Comparison of Tower Kills and Audio Record

Brewer and Ellis (1958) presented data on kills which occurred at the WCIA tower, Champaign County, Illinois, between 1955 and 1957. Our sound station was located approximately 8.5 miles southeast of this tower, and since fall, 1957, we checked the tower daily in migration season. The major kills occurred in fall on the nights of September 21–22, 1957, and September 15–17, 1958. There were other kills, but none in which more than six specimens were found.

Comparison of our recordings with kill data (Table 5) shows some interesting similarities and differences.

The number of types of calls correlated well with the number of species killed, but in each case more species were heard calling than were killed. The record for individual species suggests a possible differential rate of calling for different species from night to night, and points out one of the pitfalls for the investigator who depends entirely on the audio technique.

However, there appears to be a rough correlation between numbers of thrushes calling and thrushes killed. This ratio for all thrushes for the three kills was 8:4, 90:60, and 70:64 per cent. In each case per cent of total calls exceeds per cent of total kill, which indicates that the thrushes are vociferous by comparison with other species, for instance, the Bobolink (*Dolichonyx oryzivorus*).

Correlation between flight-call density and flight density as determined from tower-kill data was variable. The smallest kill occurred on the night (September 15–16) when the *highest* call density was recorded. The density ratio (call:kill) for this night was 1:1.7. For the other two nights the ratios were 1:3100 for both. The density as determined from kill data is consistently higher. Cochran and Graber (1958) showed that migrants are apparently attracted to tower lights, a fact which could tend to raise densities calculated from kill data out of proportion to the true density.

All three kills were associated with mass migration accompanying cold fronts from the northwest and 10/10 opaque stratus or strato-cumulus cloud

TABLE 5

COMPARISON OF AUDIO RECORD AND TOWER KILL

Audio record species	Per cent of all calls	Tower kill species	Per cent of birds killed
	September 21–22, 1957		
Hylocichla A	3	Swainson's Thrush	2
Hylocichla B	5	Gray-cheeked Thrush	2
Hylocichla C	0.6		
Bobolink	1	Bobolink	0
Total	9.6	Total	4
Number of types of calls	44 plus	Number of species killed	25
Flight-call density	7235 calls/mile/night	Flight density	226,171 birds/mile/night
	September 15–16, 1958		
Hylocichla A	74	Swainson's Thrush	10
Hylocichla B	10	Gray-cheeked Thrush	50
Hylocichla C	6		
Total	90	Total	60
Number of types of calls	6	Number of species killed	4
Flight-call density	12,900 calls/mile/night	Flight density	21,747 birds/mile/night
	September 16–17, 1958		
Hylocichla A	51	Swainson's Thrush	39
Hylocichla B	7	Gray-cheeked Thrush	22
Hylocichla C	12	Veery	3
Bobolink	1	Bobolink	11
Total	71	Total	75
Number of types of calls	20	Number of species killed	17
Flight-call density	10,265 calls/mile/night	Flight density	319,684 birds/mile/night

cover. At Champaign on the night of September 21–22, 1957, the lowest cloud layer did not fall below 3500 feet. On both September 15–16 and 16–17, 1958, the lowest layer was 3500–3800 feet early in the evening but fell to 300–400 feet by 0600.

Heavy fall migrations also occurred on September 7–8, 12–13 (highest density of season), and 14–15, 1957, and on September 7–8, and 21–22, 1958. These instances were not accompanied by continuous opaque cloud cover, and produced no kills.

There were no large kills at the tower in spring, notwithstanding the fact that on the night of May 17–18, 1959, there was opaque overcast with clouds as low as 600 feet, and the call density was 7834 per mile, i.e., higher than the density (7235) recorded on the night of the kill in September, 1957. This was the only incidence in which the volume of migration exceeded 7000 calls/mile and coincided with relatively low opaque overcast without producing a kill.

It is obvious that overcast may be only a contributing factor to the kills. It was suggested above that the occurrence of kills at the WCIA tower might be related to the circumstance of migrants overtaking a front. Kills did occur on nights when migrants caught up with slow-moving fronts, and the largest kill occurred when birds overtook the front earlier in the night.

On October 16–17, 1958, migrants passed a front at Champaign, but under clear skies, and no kill occurred. Again on May 16–17, 1958, migrants overtook a front at Champaign, but there was not complete overcast and no kill. On May 17–18, 1959, when heavy migration coincided with opaque overcast no kill occurred, but neither was there a frontal system involved.

Newman (1958:4) described a number of kills which occurred in fall, 1957, well behind a front, but our audio data suggest that at Champaign it was the combination of circumstances—heavy migration, complete overcast, and slow-moving front (which migrants overtake)—that effected large kills. Under clear skies migrants will overtake a front and continue to fly even into adverse winds without becoming confused. This may imply that night migrants are utilizing celestial orientation. On the other hand, as long as migrants are flying with favorable winds behind a front, no kill will occur even if skies are completely overcast.

Comparison of Audio Record with Field Observations

A number of valuable studies of migration have been conducted by the indirect method of observing changes in the local population of migrants during the daylight hours (Bennett, 1952; Raynor, 1956). Though our general conclusions are similar to Bennett's (1952) for Illinois, our data suggest that the indirect method at times may be misleading.

Correlation between peaks of migration as determined by nocturnal audit-

ing and by diurnal field observations was poor (Fig. 6). Indications by audio record of heavy migration were not always corroborated by the diurnal observations (note records for September 13, 1957, May 4–6 and 18, 1959). Conversely, indications of migration by diurnal observation were not always evident on the taped record (note records for September 26–28, 1957, and May 10, 1959). The very heavy migration (audio record) of September 12–13, 1957, continued at least until daylight, yet a thorough search on September 13 of several woodlands within a radius of 10 miles of the audio station revealed very few migrants. Arvin (in Nolan, 1958:41) reported a similar occcurrence in southern Texas. He heard calls of migrants on 13 consecutive nights in August but never found large numbers of migrants during the day in this period. Nolan (1958:34) stated that the cold front of September 21–22, 1957, did not precipitate notable migration in the Illinois region, though the audio record for that period shows heavy migration.

There are several possible explanations for these discrepancies. When migration calls are detected at night but no migrants are observed in the daytime, it is conceivable that the migrant swarm might completely pass an area during the night, or that the record of nocturnal calling gives us an exaggerated impression of large-scale migration, for calls of birds in the night may be more conspicuous than grounded migrants. Note in Fig. 6 that the record of diurnal observation tends to be less fluctuating than the record of calling. It is also conceivable that the local population of migrants could turn over completely, yet appear unchanged to the observer, i.e., if the observer counted 20 Swainson's Thrushes and 10 Magnolia Warblers on two consecutive mornings he might logically assume that the migrant population had not changed, even though the individual birds were entirely different on the two mornings.

The situation in which a change in the migrant population is evident, though no migration calls have been detected, may reflect the inadequacy of the audio technique. The difference between the audio and field records in late September and October, 1958 (Fig. 6), is of special interest here. The audio record in this period was largely negative, while the field record showed migration. It has already been shown (Figs. 1, 2) that heavy migration as indicated by calling tends to occur on relatively warm nights. If temperature does affect the rate of calling, reduced calling on the cooler nights of late September and October could account for the difference in volume of migration as indicated by field observation and flight-call counting. Any other factor that affects the rate of calling of migrants would, of course, affect the correlation (or lack of it) between the two sets of data.

Some Species Records.—One of the most promising aspects of study with the audio technique is the acquisition of detailed information on migration

patterns and habits of individual species. Such information depends upon the investigator's ability to precisely identify nocturnal notes. The matter of identification of the night call notes is complicated because certain species have what amounts to a night vocabulary, using a particular call only during nocturnal migration, or in daylight only at the beginning or termination of a flight. Ball (1952:49) has discussed such call notes of the *Hylocichla* thrushes.

Some species, however, utter night calls which are the same as or similar to those used in the daytime. The Dickcissel's (*Spiza americana*) night call is one which can be heard on the nesting territories frequently in daytime, especially in late summer, though it is seldom used after spring migration and before juveniles begin to appear in the nesting areas. Cuckoos utter full "songs" in flight regularly in spring, though they also use double- or triple-noted flight calls.

The real problem groups as far as identification is concerned are the calls of a number of species of warblers and small sparrows. Their "chips" or "lisps" are sharp, short, high-pitched calls which do not differ distinctively from species to species. Many of these identifications can probably be worked out with careful field study and careful study of recorded calls. Until this is done the investigator cannot realize maximum benefit from the audio method.

Whole groups of birds may migrate in silence. For instance, we have very few records of duck calls (in contrast to geese), and it seems probable that ducks are generally silent in night migration. It is also possible, of course, that very few ducks have crossed our station.

Fig. 7 shows the records of calling for several species of nocturnal migrants in the spring, 1958 and 1959, and provides information on annual variation in migration patterns. Except in the case of the Yellow-shafted Flicker (*Colaptes auratus*), migration came earlier in 1959 than in 1958. Bagg (1958) discussed the spring migration of 1958 in North America in relation to weather and pointed out that migration lagged before mid-April. Nolan (1958:356), in summarizing field notes for the Middle-Western prairie region, stated that the migration was late until mid-April, and that though the schedule caught up in late April and May, migration waves did not attain remarkable proportions. In contrast, the spring migration of 1959 in the prairie region was ahead of schedule (Newman and Lowery, 1959). These statements are corroborated by the audio record (Fig. 7).

Lunar observations.—We made lunar observations at our sound stations for only two hours, one each on April 24 and May 19, 1959, both times between 2300 and 2400, the hour when highest densities are usually recorded in lunar observations.

On April 24 the hour-station-density for 2330 was 1558 birds. No migration was recorded by the sound station in this hour and the flight-call density for the entire night was 270 calls.

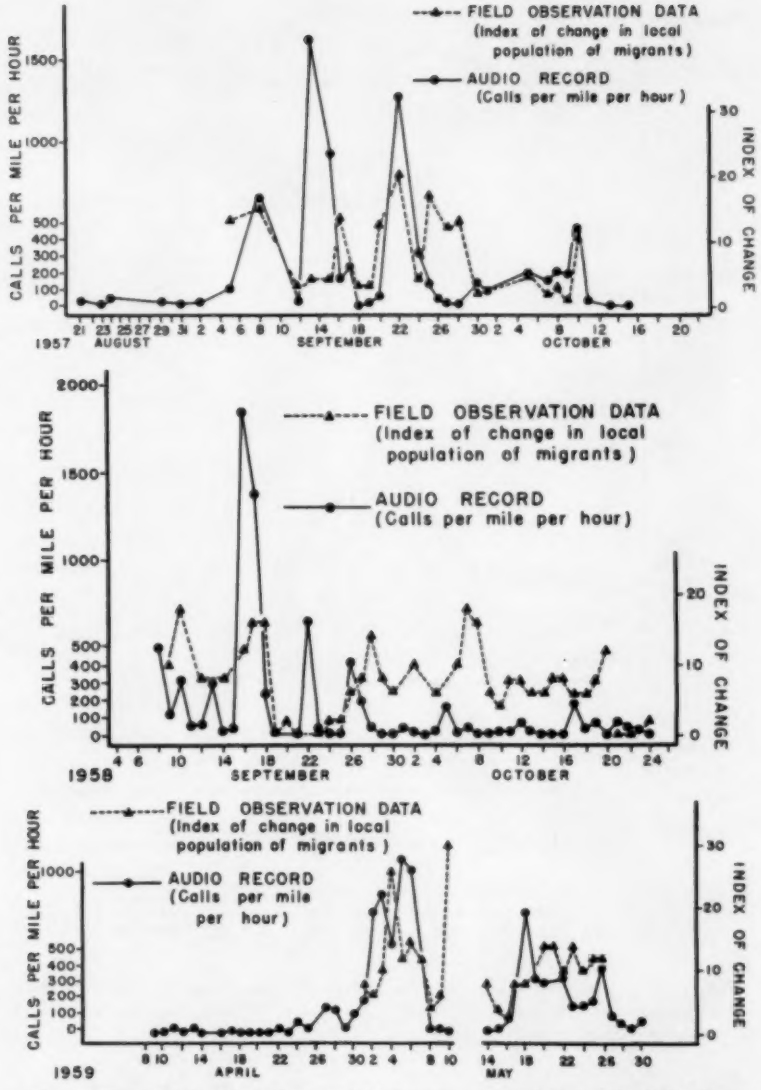


FIG. 6. Records of calling of nocturnal migrants compared with daily field observations on local population of migrants. Index of change indicates observable day-to-day change in migrant population. Not all points are plotted, but all fall on the graph lines.

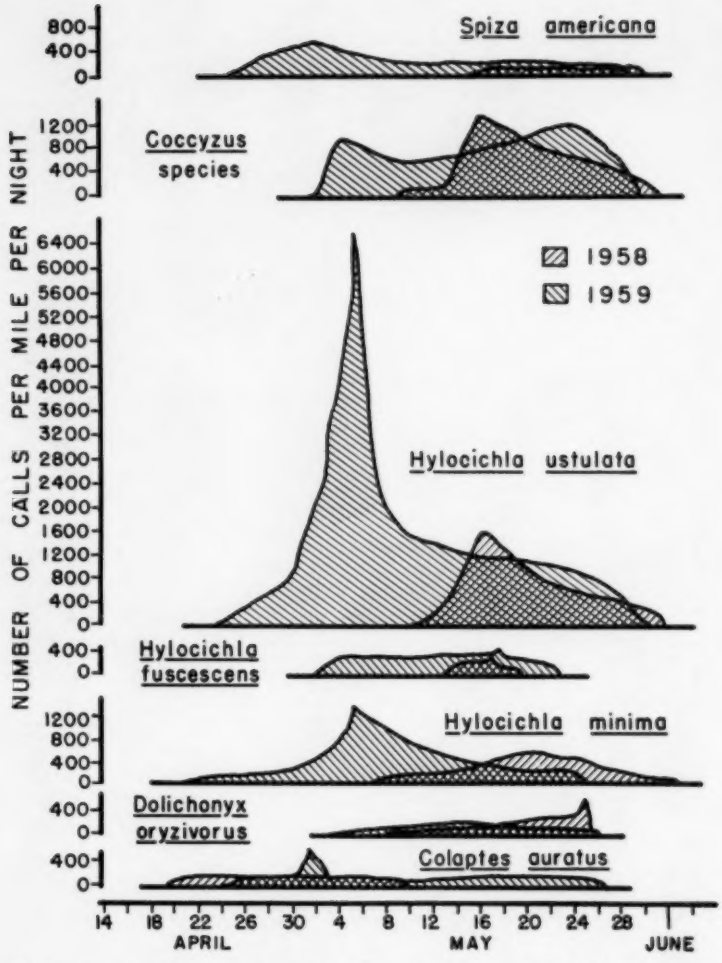


FIG. 7. Records of nocturnal calling for 7 species of migrants at Champaign, Illinois, in spring seasons of 1958 and 1959. Migration did not occur on every night, and figures show only an outline of peaks in migration.

On May 19 the hour-station-density (from lunar observations) for 2330 was 2224 birds. The hour-flight-call-density was 231 calls and the density for the night, 3666.

Both methods, then, show the same general difference, i.e., heavier migration on May 19. The magnitude of the difference indicated by the two methods (1:1.4 for lunar data and 1:13.6 for audio) indicates the expected greater variability inherent in the latter method.

Literature Cited

Bagg, A. M., W. W. H. Gunn, D. S. Miller, J. T. Nichols, W. Smith, and F. P. Wolfarth
1950 Barometric pressure patterns and spring bird migration. *Wilson Bull.*, 62:5–19.

Bagg, A. M.
1958 The changing seasons. *Aud. Field Notes*, 12:320–333.

Ball, S. C.
1952 Fall bird migration on the Gaspé Peninsula. *Peabody Mus. Nat. Hist. Yale Univ. Bull.*, 7:1–211.

Bellrose, F. C.
1958 Celestial orientation by wild Mallards. *Bird-banding*, 29:75–90.

Bennett, H. R.
1952 Fall migration of birds at Chicago. *Wilson Bull.*, 64:197–220.

Brewer, R., and J. A. Ellis
1958 An analysis of migrating birds killed at a television tower in east central Illinois, September 1955–May 1957. *Auk*, 75:400–414.

Cochran, W. W., and R. R. Graber
1958 Attraction of nocturnal migrants by lights on a television tower. *Wilson Bull.*, 70:378–380.

Cooke, W. W.
1888 Report on bird migration in the Mississippi Valley in the years 1884 and 1885. *U.S. Dept. of Agric., Div. Ec. Orn. Bull.*, No. 2. 313 pp.

Devlin, J. M.
1954 Effects of weather on nocturnal migration as seen from one observation point at Philadelphia. *Wilson Bull.*, 66:93–111.

Graber, R. R., and W. W. Cochran
1959 An audio technique for the study of nocturnal migration of birds. *Wilson Bull.*, 71:220–236.

Lowery, G. H., Jr.
1951 A quantitative study of the nocturnal migration of birds. *Univ. Kans. Publ. Mus. Nat. Hist.*, 3:361–472.

Newman, R. J.
1958 The changing seasons. *Aud. Field Notes*, 12:4–9.

Newman, R. J., and G. H. Lowery, Jr.
1959 The changing seasons. *Aud. Field Notes*, 13:346–352 + cover plates.

Nolan, V., Jr.
1958 Regional reports. Spring migration. Middlewestern prairie region. *Aud. Field Notes*, 12:356–358.

Raynor, G. S.
1956 Meteorological variables and the northward movement of nocturnal land migrants. *Auk*, 53:153–175.

Sauer, E. G. F.
1958 Celestial navigation by birds. *Sci. Amer.*, 199:42–47.

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THE CAROLINA PARAKEET IN PIONEER MISSOURI[1]

BY DANIEL MC KINLEY

THE colorful Carolina Parakeet (*Conuropsis carolinensis*) was among the many species of birds found by early travelers in Missouri. These screeching, sociable birds, the individuals almost waggish in their demeanor, the flocks resplendent in their gay feathers, brightened many a man's day. As with the Passenger Pigeon (*Ectopistes migratorius*), this species is now only a part of history. Except for a few museum specimens, the only records remaining of these delightful birds are in the vigorous prose of numerous diaries kept by people who saw them.

Widmann (1907:113–116) wrote a good account of the parakeet in Missouri. I have summarized his findings in each region of the state, for his important work is no longer freely available. Otherwise, all reports have been arranged chronologically for each region of the state. Records for marginal counties of states bordering Missouri have been included, to make the picture as complete as possible.

French explorers recorded the earliest observations on parakeets in the Missouri area, but some of their reports are too general to be precisely placed; others apply to the bird in a general way in all its range. Many such interesting reports, besides the ones I have used, may be consulted in Wright's valuable historical review (1912).

Two general comments by early geographers are interesting, for they indicate something of the attention parakeets had from hardheaded pioneers and something of the status of the parakeets in the lore of the day. Alphonso Wetmore (1837:30–31) wrote in the 1830's: "The paroquet found in Missouri deserves notice, as peculiar in character and attractive in its plumage. This is a bird strongly resembling the green parrot in colour and form; and it is reported of them, that at night they repose within the cavity of a hollow tree, hanging by their curved Roman nose-beaks. This report may require confirmation." Just previous to Wetmore, Schoolcraft, in a list of Missouri birds, wrote (1819:37): "The *parakeet* is a beautiful bird; it is a kind of parrot; its colours are green, yellow, and red, all bright colours, and it is a pleasing sight to see a flock of them suddenly wheel in the atmosphere, and light upon a tree; their gaudy colours are reflected in the sun with the brilliance of the rainbow: they are a noisy bird, but their notes are disagreeable." It is not clear to what extent Schoolcraft based his description upon personal observations or information collected in Missouri, for the only place on his 1818–1819 trip that he specifically mentioned seeing the birds was on the Mississippi River, above Brazeau ("Obrazo") Creek, July 16, 1818: "We frequently meet the paroquet on the banks of the river, and have passed

[1] Contribution from The Missouri Cooperative Wildlife Research Unit, Columbia.

several large flocks to-day. This is a kind of parrot, a beautiful bird, which is very common in Louisiana, Missouri, and Kentucky" (*ibid.*:232).

Mississippi Valley

Some of the early Mississippi Valley observations summarized here undoubtedly were meant to apply to either or both banks of the river. In July, 1673, Joliet wrote (Thwaites, 1896–1901, 58:99) that near the mouth of the Illinois River, "Parroquets fly in flocks of 10 to 12." And the same summer, above the mouth of the St. Francis River (Tennessee side?), he remarked: "We killed a little parroquet, one half of whose head was red, The other half and The neck yellow, and The whole body green" (*ibid.*, 59:149–151). Charlevoix thought the parakeets he saw on the Illinois River (north-central Illinois) in September, 1721, only stragglers at that time of year, although he stated that on the Mississippi they were found at all seasons (Charlevoix, 1923, 2:189–190). That this was true, at least for the winter as far north as Quincy, Illinois (opposite Marion–Lewis county line, Missouri), is suggested by a trader's reminiscences of 1800–01: "The long Winter, from November until Spring, had to be worn out; and I did my share of rambling with my gun, shooting paroquets, picking and eating pecans, and breaking through the ice with narrow escapes" (Anderson, 1882:149). From nearby Pike County, Illinois, came the assertion, undated as to season but probably referring to the 1830's, that "Of the parrot . . . there are great numbers . . ." (Burlend, 1936:98).

Other Mississippi River records can be considered winter observations. Probably referring to his 1810 visit to Missouri (if a first-hand observation), Nuttall (1832:546) wrote that the parakeet was "so far hardy as to make its appearance, commonly in the depth of winter, along the woody banks of the Ohio . . . and Mississippi and Missouri around St. Louis . . . when nearly all other birds have migrated." On the Ohio, just above its mouth, Audubon found parakeets in December, 1810 (Audubon, 1942:152): "The large sycamores with white bark formed a lively contrast with the canes beneath them; and the thousands of parroquets, that came to roost in their hollow trunks at night, were to me objects of interest and curiosity."

The distribution of the parakeet in the Mississippi Valley seemed to be well known, for Drake (1815:118–119) described the bird as resident "constantly along the Mississippi, Ohio, and their tributary rivers, as far north as 39°30′, and is seen occasionally up to 42°."

Not far from the place where Schoolcraft saw parakeets in July, 1818 (quoted above), Peale (1946–47:157) noted on June 2, 1819, when just above Cape Girardeau, that "parrakeets are still to be seen." About the same time, Estwick Evans (1819:306), presumably referring to the Tennessee

shore, but in the latitude of southeastern Missouri, told of the geese, ducks, and swans that he saw in the Mississippi where "numerous paroquets occupy the trees on its banks. . . . they go in flocks, and their notes are rapid, harsh, and incessant. It is remarkable, that this bird is subject to a disease resembling apoplexy." (The possibility of "apoplexy" is not too remote; see the interesting account of "Doodles," the pet Carolina Parakeet belonging to Paul Bartsch (1952).)

Paul-Wilhelm (1835:145; Bek transl., page 155) saw parakeets in the deep woods at the mouth of the Ohio in April, 1823 (Illinois side); their cries were rivaled by the noise of five species of woodpeckers.

Timothy Flint recorded several personal observations on parakeets during his descent of the Ohio in 1816, just before his travels in the Missouri region began. Toward the lower end of the Ohio he remarked how his "children contemplated with unsated curiosity the flocks of parroquets fluttering among the trees, when we came near the shore" (Flint, 1826:84). And of the Mississippi Valley, he wrote (1828, 1:108; 1832, 1:71–72):

> This is a bird of the parrot class, seen from latitude 40° to the gulf of Mexico. Its food is the fruit of the sycamore, and its retreat in the hollow of that tree; and is a very voracious bird, preying on . . . all kinds of fruit. They fly in large flocks, and are seen in greatest numbers before a storm, or a great change in the weather. They have hooked, ivory bills, a splendid mixture of burnished gilding and green on their heads, and their bodies are a soft, and yet brilliant green. Their cry, as they are flying, is shrill and discordant. They are said to perch, by hanging by their bill to a branch. When they are taken, they make battle, and their hooked bill pounces into the flesh of their enemy. They are very annoying to fruit orchards, and in this respect a great scourge to the farmer. We have seen no bird of the size, with plumage so brilliant; and they impart a singular magnificance to the forest prospect, as they are seen darting through the foliage, and among the white branches of the sycamore.

Esthetically, this view is hard to reconcile with Flint's bald statement (1828, 2:73), in reference to Missouri: "The beautiful parroquet frequents the sycamore bottoms, and poorly compensates by the extreme beauty of its plumage for the injury it does the orchard and garden fruits."

Flint's sentiment on the destructiveness of parakeets was echoed by John Mason Peck (1831:50), who discussed the birds of the central Mississippi Valley: "the paroquette, with its fine plumage, annoys the orchards and gardens"; but he later modified his stand somewhat (Peck, 1853:34): "It annoys the orchards by eating the fruit . . . but its favorite food is the seeds of the cocklebur, which it devours greedily. And, . . . it may be the farmer receives as much benefit in the destruction of this annoying weed as will compensate the loss of his apples."

On the Mississippi, above the Ohio, in March, 1833, Maximilian saw "trees quite covered with these beautiful birds" (Wied, 1857:104). It was also in this region that a Lutheran pioneer, on his way to establish a colony in Mis-

souri in the winter of 1838–39, saw parakeets (Graebner, 1919:14). Eifrig placed the event either in Kentucky or in Mississippi County, Missouri, since it is not clear which side of the river the man was on. While on a hunt on "a large and beautiful farm," a party "hunted a small species of Parrot, of which many were killed. They made a savory dish" (Eifrig, 1929). Baird (1858:68) listed an undated specimen from Cairo, Illinois, just across the Mississippi from southeastern Missouri, presented to the National Museum by Kennicott. Pindar (1925:86) heard that parakeets were occasional visitors to Fulton County, Kentucky, at the mouth of the Ohio, until 1878. Since relatively little is known of the parakeet in the Mississippi Valley above St. Louis (other than observations of Anderson and Burlend already quoted), it is worth remarking that Smith and Parmalee (1955:36) report, on the authority of T. E. Musselman, a sight record of a flock of parakeets in Adams County, Illinois, about mid-April, 1884. That is a late date for that area.

Northern Missouri

North Missouri records for the parakeet are few. Widmann (1907:115) quoted the observations of Hoy who found the birds numerous in Grand River Valley, Livingstone County, in May, 1854 (Hoy, 1865). Trippe heard in 1872 that flocks of the birds had been known in extreme southern Iowa (Decatur County), but was not able to learn exact dates (Trippe, 1873:233).

Missouri Valley

Among early travelers on the Missouri River who recorded parakeets, Widmann cited Townsend (1839:131), who saw them at Boonville, April 8, 1834; Wied (in the German edition of his Travels, 1839–41, 1:261, 263, 272–273), who reported them from Boonville westward in April, 1833, and near St. Charles in May, 1834 (*ibid.*, 2:361); Audubon (Audubon and Coues, 1898, 1:468, 469, 470, 476; 2:173), who saw several flocks and collected some birds in May and again in October, 1843; Hoy (1865), who killed one parakeet April 21, 1854, at Boonville; and Hayden (1862:154), who supplied general information on the species in the lower Missouri as a whole for 1855–57. Widmann also presented previously unpublished records from Platte County, where the last birds were seen in the early 1850's; from Warren County, where the last report was 1867; and Franklin County, where the last known date was 1865. From the Missouri Valley, also, came one of Widmann's last reports of the parakeet: Atchison County, Kansas, across the Missouri River from Platte County, in 1904 (Widmann, 1907:116).

Lewis and Clark saw the parakeet in 1804. Clark noted in his journal June 26 at the mouth of the Kansas River: "I observed a great number of Parrot queets this evening" (Lewis and Clark, 1904, 1:59). And a note by Clark (*ibid.*, 6:122) said: "*Parotqueet* is seen as high as the Mahar

[Omaha Indian] Village"—that is, to near the present town of Homer, Dakota County, Nebraska (Swenk, 1934:55).

The next record that I have is the substantial contribution of Peale, who ascended the Missouri with the Long expedition in the summer of 1819. He "heard the cries of a flock of parrakeets" when only a short distance up the Missouri River on June 1. Traveling overland north of the Missouri, near the end of June, in St. Charles or Montgomery County, he wrote: "In what few bottoms we have come through we saw turkeys and heard the screech of parrakeets." Parakeets abounded in the "buttonwood" (sycamore) forests on Loutre Island in the Missouri at the Montgomery–Warren County line, and they were still "numerous" near Cedar creek at the Callaway–Boone County line, Franklin, Howard County, and near Ft. Osage (now Sibley, Jackson County) (Peale, 1946–47:162, 267, 268, 270, 273, 275, 282). Peale reached Ft. Osage on August 1.

Paul-Wilhelm, an observant German nobleman, walked and paddled up the Missouri Valley in the summer of 1823. Just before reaching the Gasconade River, June 1, he noted (1835:221; Bek transl., p. 234): "For several days I had hardly heard the song of a single wild bird. Only the piercing cries of flocks of restless parrots and the occasional hammering of a red-headed woodpecker broke the deathlike silence." About the middle of June, he walked opposite Tabo Creek (that is, in Carroll or Ray County) (*ibid.*:254; Bek transl., p. 268): "The great amount of game, especially the great number of turkeys, and the sight of countless birds, especially the great flocks of parrots, as also the splendid luxuriant trees, together with the incomparable fragrance of the linden trees in full bloom, all these things would have repaid me amply for the strenuous foot-journey, if my attention had not been diverted in a painful manner by countless insects." By the end of June, Paul-Wilhelm (*ibid.*:246; Bek, p. 279) was above Ft. Osage when he observed: "Both banks are low, and the left was very sparsely settled. I do not recall ever having seen so many parrots in one place. When I shot one of these from a tree on which hundreds of these birds were sitting, the others did not fly away, but only made a horrible noise. The same is true if they sight a bird of prey. The flesh of these parrots is tough and black. Fish like it, however, and so it is used for bait." Parakeets were also seen (*ibid.*:274; Bek transl., p. 289) above Little Platte River, Platte County, and "great flocks" of them were seen near present St. Joseph in mid-July (*ibid.*:278; Bek transl., p. 294).

Duden saw parakeets in the winter of 1825, in Warren County; but in his letters of two years' residence, he mentioned them only once. They were destructive in orchards, he wrote a friend; "in particular, they hurl themselves in swarms upon apples" (Duden, 1829:93). It is not plain if he based his statement of their destructiveness on personal observation. There is another

record of the species from the same region at that time, for Bernhard saw several parakeets in the forests of "large and very thick sycamores" near St. Charles in April, 1826 (Bernhard, 1828, 2:99).

Beginning the decade of the 1830's, Ferris saw parakeets just west of Franklin in February, 1830 (Ferris, 1940:10): "Near the village we met with innumerable flocks of paroquets . . . whose beautiful plumage of green and gold flashed above us like an atmosphere of gems." J. T. Irving saw parakeets on the Missouri at Leavenworth in August, 1833 (Irving, 1955:25). They were plentiful at Independence in April, 1834 (Townsend, 1839:139); while, in June of the same year, Sir Charles Augustus Murray (1839, 1: 184), when just west of Leavenworth, exercised his fowling-piece upon the only feathered things present, "a small flock of green Perroquets." Unlike Paul-Wilhelm, he found them palatable. A species of parrot "that fly in droves" was reported from near Columbia about 1835 by the wife of the Boone County pioneer, Lenoir; ". . . they are not so large but their plumage brighter—we intend getting some to tame; if you can ketch one and handle it some it will not leave you" (Atherton, 1943–44:290). Count Arese saw several flocks of parakeets in the Ft. Leavenworth–St. Joseph area in summer, 1837 (Arese, 1934:67).

In a remarkably beautiful tribute to the parakeets that had "ceased to come to central Missouri since many years," Gert Goebel, a German immigrant, wrote of the species in early Franklin County. I feel that the account deserves full quotation (from Goebel, 1877; Bek transl., 1919–25, 16:549–550):

> Until the later thirties great flocks of paroquets came into our region every fall and frequently remained till the following spring. They were a small variety, about the size of a dove. They were bright green in color, and their heads were orange colored. These flocks of paroquets were a real ornament to the trees stripped of their foliage in the winter. The sight was particularly attractive, when such a flock of several hundred had settled on a big sycamore, when the bright green color of the birds was in such marked contrast with the white bark of the trees, and when the sun shone brightly upon these inhabited tree tops, the many yellow heads looked like so many candles.
>
> This sight always reminded me vividly of a kind of Christmas tree, which was used by the poorer families in my native city [Germany]. A few weeks before Christmas a young birch tree was set in a pail of water. In the warm room it soon began to produce delicate leaves. When on Christmas eve such a tree was decorated with gilded and silvered nuts and with apples and candies, it did not look unlike one of these bird-covered tree tops, only these enormous Christmas trees of the forest looked vastly more imposing than the little birch in the warm room.
>
> As the settlements increased and the forests were more and more cleared away, these birds ceased to come. The few old settlers of the days, when the paroquets frequented these parts, feel just as little at home as those beautiful birds did; they long for peace and quiet, whether above the earth or beneath, it does not matter.

(It is interesting that Bek, editor and translator of Goebel and Duden, was impressed by Goebel's eloquent testimony; he had considered Duden's

remarks on parakeets [cited above] as a flight of the latter's Romantic imagination: Bek had lived 30 years in Missouri without seeing any parakeets! [Bek, 1919–25, 16:550].)

On the Missouri Valley trip in 1843, Audubon gave but casual attention to parakeets in Missouri. On May 7 and 8, 1843, near the northwestern corner of the state, he wrote in his journal (Audubon and Coues, 1898, 1: 476): "Indigo birds [*Passerina cyanea*] and Parrakeets plentiful. . . . We saw Parrakeets and many small birds, but nothing new or very rare." Parakeets and Indigo Buntings in the same breath! (Widmann notices some other Audubon references.) In his journal of the Audubon trip, Edward Harris (1951:55) noted that the first parakeets were seen at Boonville, April 29 (not Independence, where the first ones were killed [Audubon and Coues, 1898, 1:468]). The Harris group is reported to have procured 13 parakeets on the trip upriver and eight on the passage down the Missouri; of these, 10 apparently fell to Harris as his share (Harris, 1951:207, 210, 211). This must refer only to parakeets preserved as museum specimen skins, for Audubon wrote that at least 17 parakeets were killed near St. Joseph on May 4 (Audubon and Coues, 1898, 1:470).

J. N. Baskett, while unfortunately giving no specific records, summed up the situation for about 1850 (Lewis and Clark, 1904, 6:122): "The parroquet has now practically been exterminated throughout the West; but it was found in abundance in the region of Jefferson City, Missouri (and probably even farther down the river), up to the middle of the nineteenth century." (This was written about 1900.)

There are two records of the parakeet from central and western Missouri in the 1850's that bear out Baskett's statement. Bruff wrote, on April 21, 1849, a short distance above Jefferson City: "We wooded, on the right bank Paroquets numerous" (Bruff, 1949:5). Baird (1858:68) listed the 12 specimens of parakeets collected by Warren and Hayden (Hayden, 1862:154) on April 24 and 25, 1856, on or near "Bald Island," Nebraska, near Atchison County (Swenk, 1934:56). In this area, near Brownsville, Nemaha County, Nebraska, an abundance of parakeets still survived a few years later: "I remember one season some young men raised a hundred or more of them for sale, sending them to other states. During the year 1866, or thereabout, they all suddenly disappeared, and never since to my knowledge have been seen. . . . Their nesting places were in the hollows of old trees on the island referred to" (about 10 miles above Brownsville) (Furnas, 1902). This report is probably the nearest approach to a genuine nesting record for the Carolina Parakeet in the Missouri region.

From central Missouri, where the parakeet had been so often seen in the 1820's and 1830's, a correspondent informed Cooke (1888:124) that they

were still present at Fayette in 1884–85, but were nearly extinct. The species was included in 1883 without comment in the contemporary fauna of Howard and Chariton counties (Anon., 1883:389–390). (Of some 70 county and other regional Missouri histories that I have examined, this and the confused parakeet reference in the Dunklin County history [Smyth-Davis, 1896] listed elsewhere are the only accounts of the parakeet that I found [McKinley, 1960].)

The bird had been abundant at one time about Kansas City, according to Harris (1919:270). He recorded a specimen then in the Kansas City Public Library, taken by Bryant in 1894, and remarked further: "In some unaccountable manner a lone bird strayed into the Courtney [Jackson County] bottoms in 1912 and was observed by Bush for several weeks before it finally disappeared" (*ibid.*). If the latter record is correct (and Bush seems to have been an active and reliable naturalist), it is the last date, by several years, for the parakeet in Missouri. The American Ornithologists' Union (1957: 267) cautiously lists this as "possibly an escaped cage bird," but mentions as the last reported kill for the region a parakeet taken opposite Platte County, at Potter, Atchison County, Kansas, in August, 1904 (see Widmann, 1907: 116; Remsburg, 1906; and Anon., 1906).

Southern Missouri

The parakeet is mentioned only once in the county histories of southern Missouri (actually, this relatively poor section of the state has had few histories written on its counties); that is a puzzling reference to the bird at an early date in Dunklin County (Smyth-Davis, 1896:25). That parakeets did occur in that area is confirmed by Featherstonhaugh's observations made in early November, 1834, while he was in what is now Butler County. He saw the first cane (*Arundinaria*), and then remarked: "We had also other indications of a Southern latitude here: small flocks of parroquets were wheeling and screaming about in the bright sun, and showing their brilliant colours to the greatest advantage" (Featherstonhaugh, 1844:83).

In May, 1840, Tixier (1940:106) saw huge flocks of parakeets in the "points" of forest along prairie streams between Independence and Harrisonville in western Missouri. Later, in August, he saw them near the mouth of the Osage, as he returned by boat down that river to St. Louis (*ibid.*:279). He was by then in fairly well settled, cleared land along the Osage River.

Widmann (1907:116) reported Merriam's second-hand record from Stone County in the autumn of 1891 (Merriam, 1892). Both the map of Hasbrouck (1891) and Butler's distribution data (1892:53) indicated that the Oklahoma population of parakeets reached almost to or quite into Missouri in the early 1890's. Nice (1931:101–102) listed several reports for northeastern Okla-

TABLE 1

RECORDS OF THE CAROLINA PARAKEET IN MISSOURI

Occurrences recorded by month	
January	0
February	1
March	1
April	8
May	4
June	6
July	4
August	3
September	0
October	1
November	1
December	1

Occurrences recorded only by season	
Spring	1
Summer	7
Autumn	2
Winter	5
"All Seasons"	2

Occurrences for which there are no specific seasonal data
13

homa, but she had, however, no specific records from counties bordering Missouri. Widmann reported a final sight record from Stone County, Missouri, in July, 1905 (Widmann, 1907:116).

DISCUSSION AND SUMMARY

There is no lack of reliable, even eloquent, testimony on the abundance of the Carolina Parakeet in Missouri, at least for the broad river-bottom forests along the Mississippi and Missouri rivers. Travelers who saw no other creatures (or, if they did, thought them unworthy of their journals) wrote of the magnificence of flocks of parakeets they saw in the state, both in winter and in summer (spring and summer records predominate; see Table 1). A pioneer woman wrote about them in her letters; a German settler cherished their memory; preachers dwelt on their beauty. They were certainly common into the 1840's; Audubon's party shot them without concern in 1843. Widmann gave the 1850's as the decade of the last common flocks in Missouri, but there were some later congregations, apparently even colonial nestings, in the region into the 1860's (Furnas). Probably the last Missouri specimen of which there is record was taken at Kansas City in 1894, but there were sight records in or near Missouri for 1904, 1905, and 1912. No nests were recorded from Missouri, although several observers claimed in a general way that sycamore trees were used for both nesting and roosting. Furnas's account is the best nesting record for the region, I believe.

The birds' passing is a mystery. They were undoubtedly held in disfavor for their destruction of fruit, but that point ought not to be overemphasized. They never appeared on a bounty list, and they were almost totally ignored in the county histories. Surely, if they were ever a scourge to agriculture,

their names would have appeared more commonly on the pages of these two records of materialism and manifest destiny. Some were probably shot for food or other uses, but the number could not have been great. More often, perhaps, they were shot because they furnished an easy, returning target. Primeval numbers of parakeets are not easy to guess at: they were noisy, colorful, and conspicuous birds that went about in flocks; the extent of their wanderings is not known. That is, probably anyone with an eye for birds would see them; and, if they wandered very much, one flock might be seen by people in different areas. Perhaps they had a liking for the kind of habitat created by man, at least for purposes of feeding; if so, the lack of a general sentiment in pioneer society for their protection may have been their downfall. The possibility that disease was responsible cannot be ruled out, but except for a suggestion of "apoplexy," I have no evidence for it.

Since parakeets used hollow trees for roosting and nesting, there may have been connections between the disappearance of the birds and the wholesale cutting of "bee trees." The European honey bee barely preceded the American white man in invading the central parts of America, and it became extremely abundant within a short time. I am convinced, by numerous references collected during a search through early literature, that the magnitude of destruction of hollow trees by "bee hunters" in search of honey and wax is little appreciated. What effect, if any, that had on the parakeet is unknown. Perhaps the bees themselves discouraged nesting and roosting flocks of parakeets. Reasons for their decline are made doubly difficult to evaluate by the lack of knowledge of the breeding biology, habitat, and social requirements of the species.

Excellent reviews of the parakeet in Oklahoma (Nice, 1931) and Nebraska (Swenk, 1934) have been published. Nothing has been added to parakeet literature in Kansas since the time of Goss (1891). In Iowa and Illinois the relatively scanty material can be found in Anderson (1907), DuMont (1933), Cory (1909), and Smith and Parmalee (1955). The best review of the bird in early Arkansas is in Howell's paper (1911). The collected records for Kentucky and Tennessee so far published are not exhaustive and much remains to be done in the case of Illinois, Arkansas, and Kansas.

Acknowledgments

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Literature Cited

A. O. U. Check-list Committee
1957 Check-list of North American birds (5th ed.). American Ornithologists' Union, Baltimore, xiii + 691 pp.

Anderson, R. M.
1907 The birds of Iowa. *Proc. Davenport Acad. Sci.*, 11:125–417.

Anderson, T. G.
1882 Personal narrative of Capt. Thomas G. Anderson. *Wisconsin Hist. Soc. Colls.*, 9:137–206.

Anonymous
1883 History of Howard and Chariton counties, Missouri. National Historical Co., St. Louis.
1906 (On inquiry by Otto Widmann regarding parakeet killed on Remsburg farm, Atchison County, Kansas.) *A.S. of C.C.* [Amer. Soc. of Curio Collectors] *Bull.*, 1(4):33.

Arese, F.
1934 A trip to the prairies and in the interior of North America. Transl. by Andrew Evans. Harbor Press, N.Y.

Atherton, L. E.
1943–1944 Life, labor, and society in Boone County, Missouri, as revealed in the correspondence of an immigrant slave-owning family from North Carolina. *Mo. Hist. Rev.*, 38:277–304, 408–429.

Audubon, J. J.
1942 Audubon's "Journey up the Mississippi." Ed. by J. F. McDermott. *Jour. Illinois St. Hist. Soc.*, 35:148–173 (from the *Winter's Wreath*, 1829, pp. 104–127, London, 1828).

Audubon, M., and E. Coues
1898 Audubon and his journals . . . with zoological and other notes by Elliott Coues. John C. Nimmo, London. 2 vols.

Baird, S. F., J. Cassin, and G. N. Lawrence
1858 Birds. Pacific Railroad survey, vol. 9 (Sen. Ex. Doc., no. 78, 33d Cong., 2d Sess.).

Bartsch, P.
1952 *Doodles*—a pet Carolina Paroquet; 1902–1914. *Atlantic Nat.*, 8:18–20.

Bek, W. G.
1919–1925 The followers of Duden. *Mo. Hist. Rev.*, vols. 14–19. The significant parts here are from Goebel's autobiography, in vols. 16:289–307, 343–383, 522–550; 17:28–56.

Bernhard, K., Duke of Saxe-Weimar Eisenach
1828 Travels through North America, during the years 1825 and 1826. Carey, Lea & Carey, Philadelphia. 2 vols. in 1.

Bruff, J. G.
1949 Gold rush; the journals, drawings, and other papers of J. Goldborough Bruff . . . April 2, 1849–July 20, 1851. Ed. by G. W. Read and Ruth Gaines. Columbia Univ. Press, N.Y.

(Burlend, R.)
1936 A true picture of emigration, ed. by M. M. Quaife. R. R. Donnelley & Sons (from a London edition of 1848), Chicago.

BUTLER, A. W.
1892 Notes on the range and habits of the Carolina Parrakeet. *Auk*, 9:49–56.
CHARLEVOIX, P. F. X. DE
1923 Journal of a voyage to North America. Ed. by L. P. Kellogg. Caxton Club, Chicago. 2 vols.
COOKE, W. W.
1888 Report on bird migration in the Mississippi Valley in the years 1884 and 1885. *U.S. Dept. Agric. Div. Econ. Ornithology, Bull.* 2.
CORY, C. B.
1909 The birds of Illinois and Wisconsin. *Field (Chicago) Mus. Nat. Hist. Publ. 131, Zool. Ser.*, 9:1–764.
DRAKE, D.
1815 Natural and statistical view, or picture of Cincinnati and the Miami country. Looker & Wallace, Cincinnati.
DUDEN, G.
1829 Bericht über eine Reise nach den westlichen Staaten Nordamerika's und einer mehrjährigen Aufenthalt am Missouri (in den Jahren 1824, 25, 26 und 1827). Elberfeld, Germany. (Some parts applicable to Missouri appeared in translation by W. G. Bek, *Mo. Hist. Rev.*, vols. 12–13, 1917–1919.)
DUMONT, P. A.
1933 A revised list of the birds of Iowa. *Univ. Iowa Studies Nat. Hist.*, 15(5):1–171.
EIFRIG, G.
1929 An old record of the Carolina Paroquet. *Auk*, 46:388.
EVANS, E.
1819 A pedestrious tour of four thousand miles through the western states and territories, during the winter and spring of 1818. Concord, N.H.: Joseph C. Spear. *In* R. G. Thwaites, Early Western Travels, vol. 8.
FEATHERSTONHAUGH, G. W.
1844 Excursion through the Slave States, from Washington on the Potomac to the frontier of Mexico; with sketches of popular manners and geological notices. Harpers, N.Y.
FERRIS, W. A.
1940 Life in the Rocky Mountains 1830–1835 . . . arranged by H. S. Auerbach, annotated by J. C. Alter. Rocky Mountain Book Shop, Salt Lake City.
FLINT, T.
1826 Recollections of the last ten years, passed in occasional residences and journeyings in the valley of the Mississippi. Cummings, Hilliard & Co., Boston.
1828 A condensed geography and history of the western states, or the Mississippi Valley. E. H. Flint, Cincinnati. 2 vols.
1832 The history and geography of the Mississippi Valley (2d ed.). E. H. Flint & L. R. Lincoln, Cincinnati. 2 vols. in 1.
FURNAS, R. W.
1902 The Carolina Paroquet. *Proc. Nebraska Ornith. Union*, 3:107.
GOEBEL, G.
1877 Laenger als ein Menschenleben in Missouri. C. Witter, St. Louis (not seen; see Bek, 1919–25).
GOSS, N. S.
1891 History of the birds of Kansas. Geo. W. Crane & Co., Topeka.

GRAEBNER, T. C.
1919 Lutheran pioneers. Concordia Publ. Co., St. Louis. 2 vols. (not seen; see Eifrig, 1929).

HARRIS, E.
1951 Up the Missouri with Audubon; the journal of Edward Harris. Ed. by J. F. McDermott. Univ. Oklahoma Press, Norman.

HARRIS, H.
1919 Birds of the Kansas City region. *Trans. Acad. Sci. St. Louis*, 23:1–371.

HASBROUCK, E. M.
1891 The Carolina Paroquet (*Conurus carolinensis*). *Auk*, 8:369–379.

HAYDEN, F. V.
1862 On the geology and natural history of the upper Missouri River. *Trans. Amer. Philos. Soc.*, 12 (n.s., art. i): 1–218.

HOWELL, A. H.
1911 Birds of Arkansas. *U.S. Biol. Surv. Bull.* 38.

HOY, P. R.
1865 Journal of an exploration of western Missouri in 1854, under the auspices of the Smithsonian Institution. *Smithson. Inst., 19th Ann. Rept.*, 1864:431–438.

IRVING, J. T., JR.
1955 Indian sketches, taken during an expedition to the Pawnee tribes. Ed. by J. F. McDermott. Univ. Oklahoma Press, Norman.

LEWIS, M., AND W. CLARK
1904 Original journals of the Lewis and Clark expedition, 1804–1806. Ed. by R. G. Thwaites. Dodd, Mead & Co., N.Y. 7 vols.

MCKINLEY, D.
1960 A wildlife chronology and bibliography of wildlife in Missouri. *Univ. Missouri Bull.* 61, no. 13; Library ser. 1960, no. 26:1–128.

MERRIAM, C. H.
1892 The Carolina Paroquet (*Conurus carolinensis*) in Missouri. *Auk*, 9:301.

MURRAY, C. A.
1839 Travels in North America during the years 1834, 1835, & 1836. Harper & Bros., N.Y. 2 vols.

NICE, M. M.
1931 The birds of Oklahoma. Revised edition. *Publ. Univ. Oklahoma, Biol. Surv.*, 3(1):1–224.

NUTTALL, T.
1832 A manual of the ornithology of the United States and Canada. The land birds. Hilliard & Brown, Cambridge.

PAUL-WILHELM, DUKE OF WUERTTEMBURG
1835 Erste Reise nach dem nördlichen Amerika in den Jahren 1822 bis 1824. Stuttgart: J. G. Cotta. (Typewritten translation by Wm. G. Bek, under title of "First journey to North America in the years 1822 to 1824," in Library of the Missouri State Historical Society, Columbia.)

PEALE, T. R.
1946–1947 The journal of Titian Ramsay Peale, pioneer naturalist. Ed. by Asa O. Weese. *Mo. Hist. Rev.*, 41:147–163, 266–284. (Parakeet material here is much the same as in "The six journals of Mr. Peale, naturalist . . . ," *Biol. Leaflet* no. 55, published by Leon Kelso, 1951.)

PECK, J. M.
1831 A guide for emigrants. Lincoln & Edmands, Boston.
1853 Birds of the Mississippi Valley. *Western Journal & Civilian*, 10:29–39.
PINDAR, L. O.
1925 Birds of Fulton County, Kentucky. *Wilson Bull.*, 37:77–88, 163–169.
(REMSBURG, G. J.)
1906 (Report of parakeet killed on Remsburg farm near Atchison, Kansas.) *A.S. of C.C.* [Amer. Soc. of Curio Collectors] *Bull.*, 1(3):46.
SCHOOLCRAFT, H. R.
1819 A view of the lead mines of Missouri. C. Wiley & Co., N.Y.
SMITH, H. R., AND P. W. PARMALEE
1955 A distributional check list of the birds of Illinois. *Illinois St. Mus. Popular Sci. Ser.*, no. 4.
SMYTH-DAVIS, M. F.
1896 History of Dunklin County, Mo., 1845–1895. Nixon-Jones Printing Co., St. Louis.
SWENK, M. H.
1934 The interior Carolina Paroquet as a Nebraska bird. *Nebraska Bird Rev.*, 2:55–59.
THWAITES, R. G. (ed.)
1896–1901 The Jesuit relations and allied documents. Burrows Bros. Co., Cleveland. 73 vols.
TIXIER, V.
1940 Tixier's travels on the Osage prairies. Ed. by J. F. McDermott and transl. by A. J. Salvan. Univ. Oklahoma Press, Norman.
TOWNSEND, J. K.
1839 Narrative of a journey across the Rocky Mountains to the Columbia River. Perkins & Marvin, Philadelphia. *In* R. G. Thwaites, Early Western Travels, vol. 21.
TRIPPE, T. M.
1873 Notes on the birds of southern Iowa. *Proc. Boston Soc. Nat. Hist.*, 15:229–242.
WETMORE, A.
1837 Gazetteer of the state of Missouri. C. Keemle, St. Louis.
WIDMANN, O.
1907 Birds of Missouri. A preliminary catalogue. *Trans. Acad. Sci. St. Louis*, 17:1–288.
WIED, MAXIMILIAN, PRINCE OF
1839–1841. Reise in das innere Nord-America, in den Jahren 1832 bis 1834. Coblenz. 2 vols.
1857 Ueber den Papagei von Nord-America. *Psittacus (Conurus) carolinensis Lin.* [*sic*]. *Jour. für Ornith.*, 5:97–105.
WRIGHT, A. H.
1912 Early records of the Carolina Paroquet. *Auk*, 29:343–363.

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OCTOBER 7, 1959

GENERAL NOTES

Nests of Lesser Swallow-tailed Swift in México.—Prior to Edwards' (1959. *Auk*, 76:358–359) discovery of an occupied nest on the trunk of a tree at Tikal, Guatemala, the Lesser Swallow-tailed Swift (*Panyptila cayennensis*), north of Honduras, was known only from a bird taken at Presidio, Veracruz, México, in June, 1943 (Moore. 1947. *Proc. Biol. Soc. Wash.*, 60:143–144). Edwards' note appeared shortly after I had submitted the following related observation made some 160 miles from Tikal, but in Mexico. These developments fulfill Moore's expectation and suggest that the Veracruz specimen may not represent a disjunct population.

On July 24, 1958, at Palenque Ruins, Chiapas, Mexico, elevation about 800 feet, I found a remarkable nest under the portico of the Temple of Inscriptions. From my sketch and notes made on the scene, I have been informed that it was a nest of *P. cayennensis*.

The nest, about 18 inches long, was fastened on the corbeled wall some 12 feet above the floor. Only the upper one-third, about 6 inches in diameter, was attached. The remainder, consisting of slender entrance tubing, hung vertically free. Honey-colored and rough-textured, it seemed to be made entirely of long-tailed achenes that glistened. A torn place in the top, however, exposed numerous small feathers.

This swift, known to nest in buildings, makes either a straight tube, or one with a bulbous top. The Palenque nest was of the latter type. Essentially, it fitted accounts given by Richmond (1898. *Auk*, 15:7–10), Haverschmidt (1954. *Wilson Bull.*, 66:67–69; 1958. *Auk*, 75:121–130), Sick (1958. *Auk*, 75:217–220), and others, except that the free-hanging entrance tube was bifurcated.

Beneath its bulbous top, the nest tapered before branching into two nearly parallel tubes forming the lower third of the structure. Both orifices were smooth inside, between two and three inches in diameter, and perfectly round. The left tube was about two inches shorter than its mate, with a slight outward tilt. It seemed possible that both tubes were functional, rather than the shorter one's being a "false entrance," such as Salvin (1863. *Proc. Zool. Soc. London*, p. 191) shows for the Great Swallow-tailed Swift (*P. sancti-hieronymi*). They were nearly equal in diameter and emerged symmetrically; whereas, in Salvin's drawing the "false entrance" is quite short, appearing as an inverted, open pocket midway on the outside of a long, six-inch-wide tubular nest.

I saw a second nest (badly damaged and apparently single-tubed) high on a wall inside the ground floor of the nearby Observatory ruin. The caretaker, attributing such nests to "swallows now gone for the season," voluntarily remarked that these birds had built in the ruins in previous years also.

Deploring destruction of nests of this rare Mexican bird, Sr. Miguel Alvarez del Toro, Instituto de Ciencias Naturales de Chiapas, is conferring with authorities toward ending an abuse that is doubly distressing, since, according to Haverschmidt (1954. *op. cit.*: 68–69), a nest may be used for more than one season.—Lovie M. Whitaker, *1204 West Brooks Street, Norman, Oklahoma, July 29, 1959.*

Ross Goose taken at Horseshoe Lake, Illinois.—While undertaking research dealing with Canada Geese (*Branta canadensis*) in the area of Horseshoe Lake, Alexander County, Illinois, during the fall of 1956, two small white geese were repeatedly seen on and near the refuge. Very few Snow Geese (*Chen hyperborea*) were in the area that season and none was reported killed. On November 26, one of the two small white geese was killed by a hunter and given to me for mounting. It was a Ross Goose (*Chen rossii*) in

full adult plumage but the sex was not determined. The accompanying bird was similar in size to the bird collected but had typical grey juvenal plumage.

The following measurements were taken from the skin: culmen 39 mm., total length 572 mm., wingspan 1376 mm., and tarsus 69 mm. The mounted bird is in my collection at Campbell, Missouri.

In searching the literature for reports of Ross Geese in the Mississippi Valley the following were found. Texas: one killed and two others sighted in Wharton County, winter 1954 (Miller, 1954. *Condor*, 56:132); one was taken in Jefferson County, December, 1953, and another killed on Lissie Prairie near Eagle Lake, January 3, 1954 (Buller, 1955. *Auk*, 72:298). Louisiana: one taken on Little Vermilion Bay, February 23, 1910 (McAtee, 1910. *Auk*, 27:338); one taken in Cameron Parish, 1916 (Arthur, 1931. Birds of La., Dept. of Conservation Bulletin No. 20, p. 126). Kansas: one seen in Wyandotte County, November 22, 1951 (Tordoff, 1956. Checklist of Birds of Kansas, Univ. of Kansas Publications—Museum of Nat. History, 8(5):314). Missouri: Mike Milonski, manager of the Busch Wildlife Area, Weldon Springs, Missouri, remembers one taken by his brother while hunting on the Mississippi River near St. Louis about ten years ago.—GLEN SMART, *Missouri Cooperative Wildlife Research Unit, Columbia, Missouri, July 14, 1959.*

Comment on the flight distance of the Great Blue Heron.—Orr and Sudia (1960. *Wilson Bull.*, 72:198), measured the flight distance of Great Blue Herons (*Ardea herodias*) at Lake Itasca, Minnesota. They report considerable variation of this flushing distance among what are assumed to be different individuals. Variation was not so great between successive flushes of the same individual.

Probably these authors are not aware of the fact that many herons in Itasca Park have become quite tame. The park is a sanctuary, and firearms have been prohibited, except during deer seasons, for many years. Very little molesting of wild animals occurs here. As a result, some herons have found that human occupants of boats are not to be feared but are in fact to be welcomed because dead yellow perch (*Perca flavescens*) found around fishing boats represent an easily obtained food supply. In the past 15 years I have always found at Lake Itasca several herons which have adopted the habit of alighting on shore near fishing boats or circling near to look for perch. Sometimes two or three will keep watch at the same time. We always keep some perch in the boat to throw out for them. Typically, the heron flies out to the dead fish, settles down in the water, leisurely picks up and swallows the fish, then struggles into flight and goes back to shore to watch again from a vantage point on a tree, stub, log in the water, or just the ground. Sometimes the fish is carried to the shore before being swallowed, and then it is usually washed down with a few sips of water. One heron may accept several perch in succession. If the fish is not thrown far enough away from the boat, it may be ignored or the heron may fly out and shy away more than once before returning to shore. Presumably not all the herons present on the lake have learned this method of obtaining food.

As Orr and Sudia state, marked individuals should be used in determining flight distance. In addition, such work should be carried on where unusual tameness is not a factor.—WM. H. LONGLEY, *Kasson, Minnesota, July 14, 1960.*

Additional notes on the singing height of Ovenbirds.—Stenger and Falls (1959. *Wilson Bull.*, 71:125–140) recently presented data on utilized territory of the Ovenbirds (*Seiurus aurocapillus*) of Algonquin Park, Ontario, in a variety of habitats. These data include measurements of the stratum (height) from which nine males sang (singing

height or song perch). A study now in progress at the William Hutcheson Memorial Forest, a mature oak forest on the Piedmont of New Jersey, offers some additional data for comparison. Forty-eight censuses to date, 30 during June and July of 1958, 10 in June, 1959, and others in April and May, 1959, have included observations of the singing height of at least 30 territorial males each year in the 63 acres of the forest. Stenger and Falls report that their birds sang from the lower branches of the canopy of each forest studied, which would be at heights of somewhat less than 45, 50, 55, or 85 feet according to the type of forest (Stenger and Falls, *op. cit.*, Table 1), and they observed that the height of song perches was proportional to the height of the canopy. At Hutcheson Forest, where the canopy is from 50 to 95 feet high, only 3 per cent of the singing males utilized sub-canopy perches. The majority, 71 per cent, of song perches were in the understory which is primarily of dogwood, 10 to 35 feet high. A few records (16%) show singing birds utilizing shrub or herbaceous perches. Evidently in this old oak forest, canopy height is not as important as it is in the aspen, conifer-birch, or maple-beech of Algonquin Park. Stenger and Falls indicate that in effect the Ovenbirds sang just below the densest layer of the forest canopy. Some interpretation is necessary here for Table 1 of Stenger and Falls (*ibid.*) indicates the "lower canopy" in the maple forest is the densest (85 per cent coverage at 35 feet, median values) rather than the "upper canopy," and this would then place Ovenbird singing height at near 35 feet rather than just under 85 feet, the former figure then being close to that observed at Hutcheson Forest. At any rate, singing height, or song perches at Hutcheson Forest is not as clearly related to density as in the Ontario forests, for both the dogwood understory and the oak canopy are essentially continuous, except in the area of windthrows, yet the birds utilize the lower continuous understory rather than the dense oak canopy. Territorial size does not seem to be related to height of song perches as the former is less variable than the latter, a fact in agreement with the findings of Stenger and Falls. Perhaps neither density or height of vegetation per se is a significant variable in determining singing height, though some factor operating as a consequence of density, for example, the extent of territory visible to the bird, may be involved. Certainly more data are needed on height of activity of this and other woodland species.—JEFF SWINEBROAD, *Department of Biological Sciences, Douglass College, Rutgers University, New Brunswick, New Jersey, July 7, 1959.*

Courting dance of the Whip-poor-will.—One dark night I was listening to a Whip-poor-will (*Caprimulgus vociferus*). He was very close but I could not see him. Suddenly his song stopped and a buzzing sound took its place, much as if a mechanical toy were running down. I could not imagine any bird making such a sound. I heard no more song and feared some animal had caught the bird.

Then came the summer of 1947, when a Whip-poor-will sang every night from my porch roof, his song often punctuated by the buzzing. On June 14, I stationed myself at a window opening onto the roof. It did not seem quite as dark as usual, or perhaps he sang a little earlier. There he was, almost on a level with me and not more than three feet away. I could see him very clearly, and watched his every move.

His actions as he sang reminded me of an opera singer. He turned to the left, sang *whip-poor-will*, faced the front, repeated it, and then sang it again facing right. He did this for several minutes, turning after each *whip-poor-will*. Suddenly his song stopped. He spread his wings and tail, and thrust his head forward and down. Seeming to use his head as a pivot, he turned around and around, all the time making the mechanical buzzing sound with which I had become familiar. In the increasing darkness I could not see another bird, but I feel there must have been a female nearby watching, and that

I had observed the courtship dance of the Whip-poor-will. This dance differed markedly from the courtship dance and behavior described by others, as quoted by Bent (1940. U.S. Natl. Mus., Bull. 176:164–165).—MARGARET F. FULLER, *Route 2, Frazeysburg, Ohio, August 5, 1959.*

Black Vulture extends breeding range northward.—Raymond W. Smith, reporting in 1891 the breeding of the Black Vulture (*Coragyps atratus*) in Warren County, Ohio, wrote (*Cin. Soc. Nat. Hist. Jour.*, 14:113), "This is, I think, the northernmost record of this vulture breeding, and the first record of its breeding in the state." Edward S. Thomas, having found a nest in Hocking County, Ohio, in 1923, wrote (1928. Ohio State Mus. Sci. Bull., Vol. 1, No. 1), "This seems to be the northernmost breeding record of the species in Ohio, possibly in the United States." This Hocking County site has remained the most northern location of the species reported breeding in Ohio until the present record of a nest identified by us on July 26, 1959, in the northeast corner of Licking County, about one mile south of the Knox County line in Ohio, and about 45 miles north of the Hocking County location.

Of the records of the advance northward of this species in its breeding range in the United States, the one nearest to the Licking County site is that of April, 1952, near Gettysburg, Pennsylvania, which is apparently about 30 miles south of this new nest (Grube, 1953. *Wilson Bull.*, 65:119).

The present nest contained two eggs when discovered on July 1, 1959, a late date for a Black Vulture's nesting. The nest lacked positive identification until July 26, when we saw two nestlings covered with the tan down distinctive of the young of the Black Vulture, while an adult Black Vulture perched 15 feet away. The nestlings were estimated to be about two days old.

The finding of this nest is verification of earlier indications of the nesting of this species in this region. Greider, who has been watching birds here since 1942, first saw one or two Black Vultures from time to time in the summer of 1952, and the birds have been seen here in small numbers every summer since. Wagner reported observations in the area from 1955 to 1958 (*Aud. Field Notes*, 9:381; 10:144, 254, 387; 12:260, 282).

We have data on the food of the adults and on the appearance and behavior of the nestlings as they have grown. These details (and photographs) are available for anyone interested.

On August 22, 1959, the young birds remained at or near the spot where they were hatched. This is in an open area roughly 10 feet by 40 feet framed by boulders, and at the top of a ridge covered with fairly dense small second growth. This area is about six feet below the level of the ground above. The location is in the hilly unglaciated country of the Allegheny Plateau at the foothills of the Appalachians.—MARIE GREIDER, *61 North 24th Street, Newark, Ohio,* and ELIZABETH SIDWELL WAGNER, *Utica, Ohio, August 25, 1959.*

ORNITHOLOGICAL NEWS

A conference on the potential role of birds in the epidemiology of certain viruses affecting man was held at the National Institutes of Health on April 4, 1960. The purpose was to bring ornithologists and virologists together in a joint effort to suggest solutions for these problems. A result of the discussions was recognition that many ornithological aspects need more research. For example, dates of arrival and of departure, number of migrants, distribution in South America and in southern United States, and also several physiological aspects are important problems that ornithologists might explore in more detail. The Public Health Service supports basic research that often has intrinsic ornithological value. Information about applications for grants may be obtained from: Research Grants Division, U.S. Public Health Service, Bethesda 14, Maryland. The ornithologists present at the conference were David E. Davis, Pennsylvania State University, University Park, Pennsylvania; Allan Duvall, Patuxent Research Refuge, Laurel, Maryland; William W. H. Gunn, Ontario Society of Naturalists, Toronto, Canada; and Herbert Friedmann, U.S. National Museum, Washington 25, D.C.

Thirteen 2″ × 2″ color transparencies, used by Mr. H. W. Kale to illustrate his paper on the Worthington's Long-billed Marsh Wren on Saturday morning, May 7, 1960, at Gatlinburg, Tennessee, are missing. Several of the slides were aerial photographs, two were of a young wren, and the others were of tables showing mortality, population density, etc.

If anyone can help Mr. Kale locate his slides, please do so. His address is: The University of Georgia Marine Institute, Sapelo Island, Georgia.

JOSSELYN VAN TYNE MEMORIAL LIBRARY

The following gifts have been recently received. From:

American Museum of Natural History—9 pamphlets, 8 reprints
Holly Reed Bennett—10 books, 20 journals, 6 reprints
Andrew J. Berger—1 reprint
C. T. Black—1 journal, 17 pamphlets, 157 reprints
William H. Burt—5 reprints
L. L. Dice—6 journals, 12 reprints
J. C. George—18 reprints
Charles Hartshorne—5 reprints
C. Stuart Houston—1 book
University of Kansas Museum of Natural History—1 journal
Leon Kelso—1 journal, 3 translations
Owen A. Knorr—1 journal
T. Lebret—1 reprint
Daniel McKinley—1 journal, 24 reprints
Harold F. Mayfield—9 journals, 4 pamphlets, 9 reprints
Margaret M. Nice—2 pamphlets, 23 reprints
D. F. Owen—2 reprints
Carl D. Riggs—4 reprints
Saskatchewan Museum of Natural History—17 reprints
Walter E. Scott—1 reprint
Robert K. Selander—4 reprints
J. Murray Speirs—1 reprint
O. A. Stevens—12 journals, 15 reprints
Texas Ornithological Society—55 newsletters
Heather Thorpe—1 pamphlet
Harrison B. Tordoff—2 journals
Charles Walker—2 reprints
L. H. Walkinshaw—1 translation
Wisconsin Conservation Department—1 pamphlet
University of Wisconsin Agricultural Experiment Station—3 reprints
H. E. Wolters—1 reprint

ORNITHOLOGICAL LITERATURE

BENT'S LIFE HISTORIES OF NORTH AMERICAN BIRDS. Two volumes. Edited and abridged by Henry Hill Collins, Jr. Harper & Brothers, New York, 1960: 8¼ × 5¼ in. Vol. 1 (Water Birds), xxviii + 356 pp.; vol. 2 (Land Birds), x + 374 pp. $5.95 per volume.

These are not life histories. They are not "the best of Arthur Cleveland Bent's monumental work on the birds of North America, abridged for convenient reading and reference," as the dust jackets proclaim. Bent's work was monumental because it was complete. Perhaps I have misunderstood the real meaning of "abridge." Consulting my dictionary, I find three definitions. The third is "to deprive; cut off." The publishers are eminently correct in using the word only if they refer to this category.

Volume 1 contains an introduction, a section entitled "Notes," which describes the editor's treatment of the original Bent material, a page of acknowledgments (and here Mr. Collins is called the "author"), a reprint of the "In Memoriam: Arthur Cleveland Bent," by Wendell Taber, which was published in the October, 1955, *Auk*, the individual species accounts from Gaviiformes through Charadriiformes, a bibliography, and a geographical and general index. Volume 2 contains further notes and acknowledgments, species accounts from the Columbiformes through the Passeriformes except the Fringillidae, the largest family in North America, and concludes with a bibliography, brief biographies of some of the contributors to Bent, and the two indices. While all serious ornithologists know that the Fringillidae are still to come in the Bent series, there is no mention on the dust jacket that this publication omits this family. One has to delve into the introductory remarks for the information.

What constitutes a life history? Mr. Bent, in the introduction to his first volume on diving birds, says, "After a few introductory remarks where these seem desirable, the life history of each species is written in substantially the following sequence: Spring migration, courtship, nesting habits, eggs, young, sequence of plumages to maturity, seasonal molts, feeding habits, flight, swimming and diving habits, vocal powers, behavior, enemies, fall migration, and winter habits."

One comparison will suffice. The first species in the Collins books is the Common Loon (*Gavia immer*). Mr. Collins devotes a page to it. One-quarter is delightful atmosphere by Bent and the remainder is a quotation describing early morning actions of a family of loons. Yet Mr. Bent devotes over eleven pages to habits under the following subtitles: spring, nesting, eggs, young, plumages, food, behavior, fall, and winter. In addition, there are two pages of photographs and one and a half of distribution records, with spring and fall migration dates from localities throughout the range of the species and egg dates.

The publishers say these volumes make the "essence" of Bent available in convenient form. How can the essence of a life history be boiled down from a dozen pages to one? The "essence," in these volumes, is the one trait in each species which the editor has decided is the most characteristic or interesting. Yet these are called life histories! The publishers further say that "This careful abridgment brings together the best of Bent for easy reference and reading. It uses full excerpts, not condensations." I find condensations in the text and totally inadequate references. I find on the back flap of the Volume 2 jacket that "John Burroughs writes from his Hudson cabin," yet under Burroughs in the bibliography are listed two books with no page references. Similarly, Olin Sewall Pettingill is listed there as having contributed his field notes, yet, under Pettingill, there are no specific references whatsoever.

One claim of the publishers is correct. These volumes do include some of the best of the prose which Mr. Bent used so beautifully. Had the publishers entitled this

abstract something which more truly described the contents, I would have no quarrel. But apparently they have deliberately chosen a misleading title and have misrepresented the contents upon the dust jackets. It is high time that reputable publishers stopped trading on old and honored book titles for the sale of their merchandise.—PHILLIPS B. STREET.

Tan Vat Road
Locust, New Jersey
23 May 1960

Dr. Olin Sewall Pettingill, Jr.
c/o The Editor
The Wilson Bulletin
Kalamazoo College
Kalamazoo, Michigan

Dear Dr. Pettingill:

I am writing in reply to your review of the *Complete Field Guide to American Wildlife*, by Henry Hill Collins, Jr., published by Harper & Brothers (*The Wilson Bulletin*, March 1960, vol. 72, No. 1, pp. 109–111), in which you malign both my work and character.

I note with interest that your accusations are somewhat all-encompassing: of Harper & Brothers, you say, "the same page makeup, the same use of boldface and italic type, range maps . . . as in Peterson-Mountfort-Hollom's *Field Guide* . . ."and of Collins, "he has strived . . . to pull together between two covers as much material . . . from currently successful guides . . ." I note too you fail to name the members of the Editorial Advisory Board listed in the book. They seem to be important men in their fields; I know that they are regarded as such. I also know—and I have copious letters to prove so—that the illustrations of mine which you criticize were reviewed by the chairman of this board, corrected, and, finally, passed. I would in no way infer that the comparative quality of these illustrations reflects on those who passed them, but I am confident that plagiarism is an absurdity.

For myself, I unequivocally deny having plagiarized, or "copied from" anyone. I did, indeed, consult many authorities and have been greatly influenced by them. I used every resource, including the well-represented collection of bird skins at the American Museum of Natural History as well as studies from life and innumerable books. I will answer your accusations in terms of your reference:

Figure 7 (Collins) compared with page 10 (Peterson)

First of all, any artist not doing his own book must act under the direction of that which the supplied text demands. The artist may or may not argue certain points, but in the end his work is specifically described. In this case my directions were, "Double-crested cormorant, in silhouette, to size; one sitting, one swimming, one standing." I suggested another, standing in the spread-eagled position. My instructions were (not unreasonably) to consult, in particular, two closely competitive field guides, Peterson's and Pough's (Eckelberry), in order to check thoroughly against possible errors (which would, of course, be rechecked by competent authorities upon completion of my work). My resulting silhouette illustration does closely resemble Dr. Peterson's page 10 illustration. I certainly did check Dr. Peterson's illustration and text, noting that the elevation of the bills on my birds did approximate the angle which Dr. Peterson, as a foremost authority, gave his. There are only so many poses suitable for field identification, and in this type of work he would be a poor artist who placed artistic cleverness over common logic. Beyond that, these birds are very familiar to me.

As to your criticism, consider my position at the time: (1) I had before me Dr. Peterson's drawing, and others, which I had been advised to compare; (2) I had to work in silhouette because that was what was demanded of me; (3) I should not violate one of the rules (where possible) of book illustrations, that is, to face the subject away from the center line. You see the result, and you call it "copied." I did, as you see, face my sitting bird "in," as did Peterson, and the spread-eagled bird is the same. As you have in another sketch, you can accuse me of having "turned the swimming bird around." But what of the flying bird? And the water is, you must agree, of a different nature than is Dr. Peterson's. If "to copy" is to have four birds made from three, perhaps you are right.

Figure 26 (Collins) compared with page 67 (Peterson)

Here we have much the same problem: how to keep it from being "like Peterson." I will agree with you in this case. My turkey vulture shows a nearly identical resemblance to Dr. Peterson's. I can assure you that my "copying" was inadvertent. My effort at combining these types of flight, obviously my own effort, went unmentioned.

All of the raptorial birds shown, with the exception of the peregrine and marsh hawk, are commonly found near my home, and four of them, including the bald eagle, have nested less than a half mile away within the past year.

Figure 45 (Collins) compared with page 162 (Peterson)

You say "here and there the artist has simply rearranged the subjects and made minor alterations," giving the swallows as a case in point. I reiterate: it was not my book and I was simply following instructions: "arranged on a wire." If this should sound in any way an excuse, I do not mean it to be. Personally, I liked the wire. My actual source of reference was a photograph of martins on a wire by Mr. Wharton Huber, in Stone's *Birds of Old Cape May*, vol. 2, p. 695. From that photograph I "stole" my idea of a slack wire. I did not (and *could* not) credit Mr. Huber. But I cannot help but think that Mr. Huber would not have minded.

Figures 14, 15, 19 and 20 (Collins) Ducks.

May I say here, first of all, that your statement, "He has taken pains to have all the ducks fly in the opposite direction," seems unnecessary when a quick inspection will clearly indicate that *all* the plates in Collins' book face the same direction, i.e., to the right.

As for the ducks themselves, they are, as are Dr. Peterson's, rendered in a wash technique. There is a great similarity, I will admit, but they were in no way "copied." By a simple juxtaposition I could easily have placed the mergansers on top, or in the middle of the plate. I could have mixed them with the pond ducks or designedly have altered the wing pattern from a uniform wing (as in Peterson) to varied poses of flight. I chose to do them the way they are seen. Again, they are portrayed according to specific instructions as to which bird was to be shown. And all of these species are well known to me in life.

Plate 6 (Collins) Herons.

I have no argument whatever with your statement that all of the "illustrations in color are amateurish in the extreme." That is your opinion. And your opinion that there was "no conscientious endeavor" on my part is also your own. Your statement about the male American Redstart is pertinent. My error is obvious. I can assure you that I made others, but most were corrected in time by Mr. Collins and his advisors. But again, your insinuation that I copied Don Eckelberry's "body attitudes and views" is abhorrent. There is no doubt at all that my American Bittern strongly resembles Mr. Eckelberry's (Plate 14, Pough). However, I believe you will encounter a surprising similarity between my own attempt and that of Fuertes (Plate 23, p. 242, *Birds of*

America). The "stake-driver" is a "back yard" bird to me; he lives in the swamp below my window. I hear him and I see him. I am well aware of the length of his toes and that they will often overlap. I have, in fact, a "stuffed" specimen of him. Notice, if you will, that the inner toes of my bittern *do not overlap*. I would challenge a jury to find, upon a close investigation, exactly who copied from whom.

In regard to the "body attitudes and view" of my green heron versus Mr. Eckelberry's, I again must call attention to Mr. Fuertes (Plate 23, p. 242, *Birds of America*). You will notice that my bird, however weak you may consider the rendering, is at least stepping out with some vigor, as he daily (in season) goes soberly up and down the narrow strip of beach below my lawn.

As to the Great Blue Heron, I agree that mine somewhat closely follows Mr. Eckelberry's. However, were Mr. Eckelberry's rendering, Fuertes', and my own compared minutely, one would find that there is a similarity between all three.

My point is that there is a right reason for drawing birds in the position in which they are seen because they are typical.

I have long admired Dr. Peterson's work. More recently, I have followed Mr. Eckelberry's work with consummate interest; he is, in my opinion, a truly fine artist. I have *learned* from these very gifted artists, not "copied." You will note that my adult night heron has a similar arrangement of crest feathers to that shown by Mr. Eckelberry. You will notice that Fuertes (and many others) also used it. Surely the bird itself is in no way similar, except for its species and age. If Mr. Eckelberry (or anyone else) should tell me that all poses and attitudes which he has ever used were entirely original and did in no way reflect either Audubon, Fuertes, others, or photographs other than his own, I should be frankly amazed. You gave just praise to Mr. Richard Ryan. Can it be truly said that Mr. Ryan personally tramped the ranges of his maps, or did he borrow competent information from other authorities? I would in no way argue about your conclusions as to the quality of my illustrations but I strenuously object to your manner of attack.

Your mention of credit where credit is due suggests to me that a dual justice might be rendered. If my art work under my name is legally proved to be all that you say, you can be assured that a second edition will bear a proper recognition of its sources. But in like manner I believe it not untoward to suggest that your attitude in this manner is not entirely without prejudice. I, too, from its first edition, have owned, used and cherished Roger Tory Peterson's *Field Guide to the Birds*. My name is also Peterson. I also paint birds. Perhaps you have not noted the similarities in name and circumstance. I can assure you that Harper & Brothers and Mr. Collins have been well aware of this similarity and have never considered using my name in a manner to in any way capitalize upon Dr. Peterson or his enviable reputation. I was chosen to do the Collins book not as an ornithologist (which I am not) but as an artist who has some familiarity with birds (which I am). I have never at any time knowingly exploited this similarity in names or circumstance between Dr. Peterson and myself.

There is no doubt that your harsh criticism of my work will do me professional injury. I would in no way demand a retraction of your opinions as to the quality of my work, but I believe you have overstepped your authority in rendering a judgment on morals. I should be content with the publication of this rebuttal in the *Wilson Bulletin* that your readers may have the opportunity of checking for themselves, point for point, reference for reference, and inclusive of all references, the accusations you have leveled against me.

Very truly yours,

S/ Russell Francis Peterson

Russell Francis Peterson

THE TECHNIQUES OF DRAWING AND PAINTING WILDLIFE. By Fredric Sweny. Reinhold Publishing Corporation, New York, 1959: 8½ by 10½ in., 144 pp., many illustrations in black and white and color. $10.00.

This book is an attractive, colorful, profusely illustrated guide which will probably prove stimulating to embryonic wildlife artists. The brevity and over-simplification of the text will perhaps unduly encourage young artists to go into the field under the false impression that it is a comparatively simple task to take the necessary steps to become a successful wildlife artist. Whether this is intentional or not, it probably will enhance the sales appeal for the publisher. The following understatement typifies this tendency: "The wildlife artist should first develop a thorough knowledge of the anatomy of animals, birds, and fish, their habitat and behavior, and then be very discerning in the use of that knowledge. A certain amount of field work will be necessary to achieve this informative background." Skimming so lightly over a lifetime of study and experience to gain "this informative background" impresses a naturalist as a bit misleading, to say the least. Perhaps this is legitimate, however, since the book purports to discuss *techniques* of wildlife illustrating.

Again the zoologist is a bit irritated to find the three major sections of the book entitled "Birds," "Fish," and "Animals." The author throughout the text erroneously uses the word "animal" as synonymous with "mammal," not recognizing the fact that birds and fishes are as much animals as are the mammals.

Mr. Sweny has a sweeping freedom in his sketching technique that is pleasing, and his use of gray paper with lampblack and opaque whites is very effective. I was pleased with his emphasis on abstract designs as basic to good completed paintings. His simplified anatomical drawings are good for a basic understanding of the action of different animals. However, rather serious errors appear, indicating that his observations of details are not always accurate. For example, on page 26 in the sketch of the lower aspect of a duck's wing feather arrangement, he demonstrates the impossible by correctly showing the posterior vanes of the primary flight feathers overlapping the anterior vanes, while viewed from above the same arrangement appears. Although partially explained on page 25, he apparently does not understand how the narrow stiff anterior vane overlies the wider weak posterior vane, thus giving the latter support on the down stroke while allowing the feathers to open up like check-valves on the up-beat. The Gadwall using the upper wing on page 26 would find his check-valves opening on his down-beat! On page 32 the feet of various species of birds fall far short of having the character they might due to the artist's failure to recognize the correct groupings of scutes or scales, especially at the junctions of the legs and toes and at the bases of the claws. Again, on page 112, the two halves of the deer hoof are incorrectly shown joined together at the posterior margin.

The mammal (animal) section has some very good action sketches of deer in various gaits; it goes into considerable detail in the terminology of bones and muscles; and carries a painting through all the steps that Mr. Sweny takes in completing a painting. As is often the case with artists, his completed paintings do not fulfill the promise displayed in his sketches.

It is interesting and informative to know what the oil painting procedures of Mr. Sweny are, what colors comprise his palette, the surface on which he chooses to paint, etc. It seems definitely limited, however, not to find any discussion of other materials, techniques, brushes, and canvases that other painters in oil might consider desirable. Furthermore, no mention is made of watercolor, pen and ink, gouache, and all the other techniques one might employ in wildlife drawing and painting. The elaborate table of contents and the index (5 pages of 3 columns each of closely-spaced type) are quite misleading as to the

amount of information in the volume. In this it follows the modern trend of allowing pictures to carry the bulk of the book and reducing the informative text *ad absurdum*. In fact, this book might better be entitled "The Techniques of Fredric Sweny in Drawing and Painting of Wildlife."—W. J. Breckenridge.

Instructions to Young Ornithologists: Bird Biology. By J. D. Macdonald. Museum Press Limited, London, 1959: 5½ × 8½ in., 128 pp., frontispiece, 16 pls., 20 figs., 2 tables. 12*s* 6*d* (about $1.75).

The author achieves admirably the stated purpose of this little book "to provide a brief outline of the whole life of birds" in order to satisfy the desire of bird watchers, young in years or young in the study of birds, for knowledge of birds in addition to that of identification. In a book of this size many subjects must be omitted. Twelve topics that have been included are: Preparation for Mating; Nests and Eggs and Family Care; Population; Migration; Distribution; Habitats and Adaptations; Adaptations for Flight; Feathers; Collecting and Digesting Food; Lungs and Heart; Other Anatomical Features; Variation and Evolution.

Writing is clear and concise. Previous training in biology is not necessary for understanding. Halftones and line drawings are of high quality. The table of bird weights on p. 81 may surprise readers when they learn how little birds in general weigh. The use of examples "biased in favour of British readers" lessens little the usefulness of the book to Americans.

This book should prove useful in the libraries of schools, teachers, and beginners in ornithology.—Oscar M. Root.

A Natural History of New York City. By John Kieran. Houghton Mifflin Company, Boston, 1959: 5¾ × 8¾ in., xvi + 428 pp., many drawings by Henry Bugbee Kane. $5.95.

With the publication of "A Natural History of New York City" we have another book devoted to wildlife in a great metropolis, and from an author qualified by nearly fifty years of residence. "London's Natural History" (Collins, London, 1945) was one of the first, if not the first, to take as its topic the fauna and flora of a huge city. Its author, R. S. R. Fitter, had always lived in London. "Unseen Life of New York: As a Naturalist Sees It" (Duell, Sloan and Pearce, New York; and Little, Brown and Company, Boston, 1953) by William Beebe was a more recent contribution along the same line. In all three books the authors set the stage by first giving an historical account of the setting (Dr. Beebe devoted over half of his book to the past), but from there on their methods of presentation diverge. Mr. Fitter proceeded to discuss the effects of smoke, trade, traffic, etc. on wildlife. Dr. Beebe, under such chapter headings as "Too Small To Be Seen," and "Too Clear To Be Seen" chose to discourse entertainingly and at length on a few creatures to the exclusion of many others. Mr. Kieran, however, has undertaken to show *how* and *where* wildlife exists in a metropolitan environment. His task has been a formidable one for he has attempted to discuss *all* forms of life from plankton and protozoa. His purpose is to interest people, not to provide a compendium of information. New Yorkers and others with a fondness for the great city will relish the many personal reminiscences based on a half century of nature-walking seldom beyond the view of tall buildings. In the two chapters on birds, one-fifth of the book, the author is more at ease and loquacious, for he is dealing with his favorite subjects. Ornithologists will be interested particularly in the way such birds as the Peregrine Falcon have adjusted themselves to the world of skyscrapers. The sensitive lithographs by Henry Bugbee Kane greatly complement the text.—Olin Sewall Pettingill, Jr.

PROCEEDINGS OF THE FORTY-FIRST ANNUAL MEETING

BY AARON M. BAGG, SECRETARY

The Forty-first Annual Meeting of the Wilson Ornithological Society was held at Gatlinburg, Tennessee, from Thursday, May 5, to Sunday, May 8, 1960. The meeting was sponsored by the Knoxville Chapter of the Tennessee Ornithological Society. The local Committee, under the energetic direction of Mrs. Robert A. Monroe, Chairman, and Paul Pardue and David Highbaugh, Co-Chairmen, was most efficient in organizing a truly excellent meeting, to the interest and enjoyment of the 332 registered members and guests who attended.

Four sessions were devoted to papers, and two business meetings were held, all in the Huff House. The meeting opened with an informal reception there on Thursday evening, when Arthur Stupka showed slides of the Great Smoky Mountains National Park. Thursday evening was also the occasion for the meeting of the Executive Council, at the Mountain View Hotel. On Friday evening, the Knoxville Chapter of the T. O. S. presented an informal showing of movies and slides in the Huff House. The Annual Dinner was held on Saturday evening at the Mountain View Hotel, with Lawrence H. Walkinshaw presenting the President's Address. This was followed by an excellent color film, *Four Seasons at Hawk Mountain*, presented by Maurice Broun, in the Huff House. The Local Committee had decorated the tables attractively, at the dinner, with a souvenir pewter reproduction of the Dogwood flower at each place setting.

Early-morning field trips were scheduled for Friday and Saturday. On Sunday, members could choose among field trips to Andrews Bald, Newfound Gap, and Clingman's Dome, as well as other parts of the Great Smoky Mountains National Park.

First Business Session

President Walkinshaw called the meeting to order at 9 a.m., Friday, May 6. Mr. Paul Pardue, President of the Tennessee Ornithological Society, welcomed the members and guests of the Wilson Ornithological Society. President Walkinshaw responded on behalf of the Society.

The Proceedings of the Fortieth Annual Meeting were approved as published in *The Wilson Bulletin* for September, 1959.

Secretary's Report

The secretary, Aaron M. Bagg, summarized the principal actions taken at the Thursday evening meeting of the Executive Council, as follows:

1. The Council voted to accept the invitation of the Federation of Ontario Naturalists, the Audubon Society of Canada, and the Royal Ontario Museum, to the Wilson Society, to hold its 1961 meeting at Britannia Lodge, in the Muskoka District of Ontario, June 8–11, 1961.

2. The Council instructed the secretary to proceed with arrangements for the 1962 Wilson Society meeting to be held at Purdue University, in Indiana, sometime in April, 1962.

3. The Council approved the suggestion that the possibilities of an early-May, 1963, Wilson Society meeting in Charleston, S. C., be explored.

4. The Council re-elected H. Lewis Batts, Jr., as editor of *The Wilson Bulletin*.

Treasurer's Report

The treasurer, Merrill Wood, submitted the following report on the finances of the Society:

Report of Treasurer for 1959

General Fund

Balance as shown by last report, dated December 31, 1958 (Includes $103.27 in reserve for Library Fund)			$ 4,474.70
RECEIPTS			
Dues:			
Active memberships	$5,267.50		
Sustaining memberships	939.00	$6,206.50	
Subscriptions to *The Wilson Bulletin*		997.09	
Sale of back issues and reprints of *The Wilson Bulletin*		273.61	
Interest and dividends on savings and investments		592.98	
Gifts		6.00	
Miscellaneous		141.54	8,217.72
Total receipts			$12,692.42
DISBURSEMENTS			
The Wilson Bulletin (printing and engraving)		$6,414.03	
The Wilson Bulletin (mailing and maintentance of mailing list)		788.62	
Treasurer's expense (printing, postage, safe deposit box and transfer of records)		376.81	
Back issue expense (reprinting and postage)		51.49	
Committee expense (Membership and Endowment)		47.19	
Annual Meeting expense		251.76	
International Council for Bird Protection (for membership in 1958 and 1959)		50.00	
Josselyn Van Tyne Memorial Library book fund (to separate account)		103.27	
Louis Agassiz Fuertes Research Fund (to separate account, Council action)		175.00	
Miscellaneous		128.74	
Total disbursements			$ 8,386.91
Balance on hand in First National Bank, State College, Pennsylvania, December 31, 1959			$ 4,305.51

Josselyn Van Tyne Memorial Library Book Fund

RECEIPTS			
Reserve in General Fund (to separate account)		$ 103.27	
Sale of duplicates and gifts		288.10	
Total receipts			$ 391.37
DISBURSEMENTS			
Purchase of books		$ 107.96	$ 107.96
Balance on hand in First National Bank, State College, Pennsylvania, December 31, 1959			$ 283.41

Louis Agassiz Fuertes Research Fund

RECEIPTS			
Transfer from General Fund (to separate account, Council action)		$ 175.00	
Gift		50.00	
Total receipts			$ 225.00

DISBURSEMENTS

None

Balance on hand in First National Bank, State College, Pennsylvania, December 31, 1959 ..... $ 225.00

ENDOWMENT FUND

Balance in Savings Account as shown by last report, dated December 31, 1958 ..... $ 1,120.58

RECEIPTS

Life Membership payments	$2,165.00	
Patron Roger Tory Peterson	400.00	
Patron Mrs. Herbert Carnes	400.00	
Patron R. M. Strong (anonymous donor)	500.00	
Redemption of U.S. Savings Bonds	6,194.25	
Stock dividends received (included below):		
3 shares Massachusetts Investors Trust		
17½ shares Fireman's Fund Insurance		
Total receipts		$10,779.83

DISBURSEMENTS

Purchase of U.S. Treasury 4% Notes due May 1963 and U.S. Treasury 4% Bonds due October 1969	$ 7,003.85	
Balance in Savings Account, First National Bank, State College, Pennsylvania, December 31, 1959	3,775.98	
Total disbursements		$10,779.83

SECURITIES OWNED

$5,000 U.S. Treasury 4% Notes due May 15, 1963 at 96¾	$4,837.50	
$5,000 U.S. Treasury 4% Bonds due Oct. 1, 1969 at 94¼	4,712.50	
15 shares Kaiser Aluminum & Chemical Co. 4¾ cum. cvt. pfd. at 121	1,815.00	
391 shares Massachusetts Investors Trust at 13.94	5,450.54	
87½ shares Fireman's Fund Insurance at 51½	4,506.25	
25 shares Owens-Illinois Glass Co. 4% cum pfd. at 108¼	2,706.25	
(Securities listed at closing prices December 31, 1959)		
Total securities owned		$24,028.04
Total in Endowment Fund, December 31, 1959		$27,804.02

Respectfully submitted,
/s/ MERRILL WOOD
Treasurer

Research Grant Committee

Harvey I. Fisher, chairman, reported that his committee was fortunate this year in having "eight good candidates for the Grant." He added his belief that "notices published in our own *Bulletin*, as well as in *Auk* and *Condor*, called attention to the Louis Agassiz Fuertes Research Grant, and resulted in this fine response." The committee recommended that one grant of $100.00 be awarded to Mr. Robert T. Lynn, 1016 E. Arkansas, Norman, Oklahoma, to study "the comparative behavior of the Carolina and Bewick's wrens."

Membership Committee

Hazel Bradley Lory reported that, while she had no formal statement to make, the

work of the committee was progressing and bearing fruit, for the membership of the Wilson Society now exceeds 1500, and for the second year in a row there has been a net gain in membership.

Library Committee

William A. Lunk, chairman, reported by letter as follows:

In the past year the Library Committee has functioned routinely, although without formal meetings during the period, and with a minimum of new business to transact.

No further action has been taken on adjusting the stocks of back issues. An increasing storage problem continues to exist, and eventually an official decision as to the wisest disposition of surpluses will have to be forthcoming. In the past, several possibilities have been discussed, but no conclusions reached.

Some of the surplus items set aside for sale are still available, and lists will be furnished on request to those interested. Money from book sales has gone to swell the library's New Book Fund, which in spite of recent purchases contains a current balance of some $280. There are always desiderata; but a substantial cash balance is desirable in the event that wanted books become available. Contributions to this fund are solicited, as are recommendations from any of the membership regarding specific items that might be acquired. Also, it is suggested that members wishing to make donations of individual items could contact the committee for appropriate suggestions.

Much credit is still due Norman Ford (Technical Aide, Bird Division, Museum of Zoology, University of Michigan) for his attendance to all routine business of the Josselyn Van Tyne Memorial Library. The close cooperation between the Wilson Ornithological Society and the Bird Division Library continues to work to mutual advantage.

The library is now regularly receiving 104 journals, 79 as exchanges and 25 as gifts. In addition, 73 separate donations have been received (including Mrs. Van Tyne's): 295 reprints, 122 books (110 of these from Mrs. Van Tyne), 49 journals, 29 pamphlets, 8 translations, and 23 color prints. Approximately 40 out-of-town loans, involving 120 items, were made during the year—and, as in the past, there was constant use of the material by persons on the campus or visiting.

The committee wishes to express appreciation for the continued support of the members, but to urge more general participation. Donations, whether of cash or books, requests for loans, and constructive suggestions, are all welcome.

Endowment Committee

Richard Zusi, chairman, reported by letter as follows:

This committee, at present comprising only the chairman, began functioning in December, 1959. At that time the most important task seemed to be to send letters soliciting Life Memberships before the members had paid their 1960 dues; consequently I did not take time to set up a committee. A committee will be set up in time to send letters before the next dues notices are mailed.

Life Memberships in the Wilson Ornithological Society on December 7, 1959, totaled 165, with an additional 4 patrons. Since that time there have been 12 new Life Members, 7 of whom have joined in response to my letters. I sent 102 letters between December 31 and January 13. Many members may already have paid their dues and decided to wait until next year to think about Life Membership, as several indicated to me.

All letters were typed individually, and a mimeographed list of Life Members was enclosed with each. Our thanks should be extended to Mrs. Jennie Boynton, secretary of the Zoology Department of the University of Maine, who did the secretarial work, refusing remuneration for it.

Temporary Committees

The President appointed the following temporary committees:

Auditing Committee
David E. Davis, Chairman
Dorothy Bordner
Ward Sharp

Nominating Committee
O. S. Pettingill, Jr., Chairman
John T. Emlen, Jr.
Burt L. Monroe

Resolutions Committee
Leonard C. Brecher, Chairman
Karl E. Bartel
W. D. Stull

SECOND BUSINESS SESSION

The final business session was called to order at 3:00 p.m., Saturday, May 7.

On motion duly made and seconded, the report of the Membership Committee was accepted, and the candidates were elected to membership in the Society.

Report of the Auditing Committee

The committee reported by letter that they had examined the books and accounts of the treasurer and had found them to be in excellent condition. The committee added that "the records are neatly kept and receipts and expenditures are posted promptly."

On motion duly made and seconded, the report of the Auditing Committee was accepted.

Report of the Resolutions Committee

Leonard C. Brecher, chairman, read the following report:

WHEREAS the Wilson Ornithological Society is in session at its Forty-first Annual Meeting in Gatlinburg, Tennessee,

BE IT RESOLVED that the Society express its appreciation to the Local Committee under the leadership of Mrs. Robert A. Monroe, Chairman, and Mr. Paul Pardue and Mr. David Highbaugh, Co-Chairmen, for the careful planning and organization which have made this meeting so enjoyable and interesting to the Wilson Ornithological Society's members and friends;

AND BE IT FURTHER RESOLVED that the Society express its thanks to the Knoxville Chapter of the Tennessee Ornithological Society for its hospitality in providing refreshments, transportation, and leadership for the field trips;

AND BE IT FURTHER RESOLVED that the Society thank the National Park Service, Mr. Fred Overly, Superintendent, Mr. Arthur Stupka, Naturalist, and other members of the park personnel for their cooperation in our use of the Great Smoky Mountains National Park;

AND BE IT FURTHER RESOLVED that the Society express its appreciation to Dr. Lawrence H. Walkinshaw for his devoted service during his two years of office as President of the Society;

AND BE IT FURTHER RESOLVED that our members continually alert their legislative representatives to the need of creating new—and maintaining present—wilderness areas and wildlife habitats, and for the necessity of having spraying programs approved by the Fish and Wildlife Service;

AND BE IT FURTHER RESOLVED that the members of the Society living near television towers be urged to organize and maintain suitable records of the quantities and species of the birds killed by impact with such towers, and see that such specimens are put to scientific use.

On motion duly made and seconded, the report of the Resolutions Committee was accepted.

Election of Officers

The Nominating Committee proposed the following officers for the coming year: President, Harold F. Mayfield; First Vice-President, Phillips B. Street; Second Vice-President, Roger Tory Peterson; Secretary, Aaron M. Bagg; Treasurer, Merrill Wood; Elective Member of the Executive Council, Harvey I. Fisher (term expiring 1963).

The report of the committee being accepted, and there being no nominations from the floor, the Secretary was instructed to cast a unanimous ballot for these nominees.

PAPERS SESSIONS

Friday, May 6

1. Jack P. Hailman, Bethesda, Maryland. *A Field Study of the Mockingbird's Wing-flashing Behavior*, slides.
2. Frederick V. Hebard, Philadelphia, Pennsylvania. *The Origin and Nature of Feigning.*
3. John William Hardy, Museum of Natural History, University of Kansas. *Remarks on Social Behavior in the Orange-fronted Parrot*, Aratinga canicularis, slides, movies.
4. Kenneth C. Parkes, Carnegie Museum, Pittsburgh, Pennsylvania. *An Intergeneric Hybrid in the Family Pipridae.*
5. W. E. Clyde Todd, Carnegie Museum, Pittsburgh, Pennsylvania. *Audubon's Labrador Records.*

Symposium: *The Ecological Significance of Bird Weights.* (papers 6 through 10). Eugene P. Odum and Herbert L. Stoddard, presiding.

6. David W. Johnston, Wake Forest College, Winston-Salem, North Carolina. *Body Weights in Relation to Heart Weights in Birds.*
7. James Baird, Norman Bird Sanctuary, Midletown, Rhode Island. *Weights and Bird Banding with Special Reference to the Catbird.*
8. Carl W. Helms, Hatheway School of Conservation Education, South Lincoln, Massachusetts. *Weights and Winter Survival in Buntings.*
9. Clyde E. Connell, Valdosta State College and the University of Georgia. *The Significance of Fat-free Weights with Special Reference to the Savannah Sparrow.*
10. Eugene P. Odum, University of Georgia. *Flight Ranges of Some Migrating Birds as Calculated from Weights.*
11. Douglas James and Wayne James, University of Arkansas, and Robert Frazer, Taunton High School, Massachusetts. *Nocturnal Orientation Independent of Stars*, slides.
12. Herbert L. Stoddard, Sr., Thomasville, Georgia. *Bird Casualties at a Florida TV Tower.*
13. Thomas W. Finucane, Kingsport, Tennessee. *The Fall Migration of Hawks across Tennessee*, slides.

Saturday, May 7

14. Charles H. Trost, Pennsylvania State University. *Pileated Woodpeckers in Captivity*, slides.

15. James T. Tanner, University of Tennessee. *The Stimuli for the Start of the Reproductive Season in Juncos*, slides.
16. Lester E. Eyer, Alma College, Alma, Michigan. *The Golden-winged Warbler at Itasca State Park, Minnesota*, slides.
17. Maurice Brooks, West Virginia University. *Swainson's Warbler in the Southern Appalachians.*
18. Herbert W. Kale, II, University of Georgia. *Population Ecology of Worthington's Marsh Wren* (Telmatodytes palustris griseus) *in Georgia's Salt Marshes*, slides.
19. Harold Mayfield, Waterville, Ohio. *Nest Success Calculated from Exposure*, slides.
20. Paul A. Stewart, U. S. Bureau of Sport Fisheries and Wildlife, Gadsden, Alabama. *Nesting Success of Birds Following a Field Application of Heptachlor*, slides.
21. William B. Robertson, Jr., Everglades National Park, Homestead, Florida. *The Bald Eagle Breeding Population of Southern Florida*, slides.
22. Edmund A. Hibbard, St. John's University, Collegeville, Minnesota. *Birds of the Missouri River Valley as Affected by the Garrison Dam in North Dakota*, slides.
23. David Kenneth Wetherbee, U. S. Fish and Wildlife Service, Mass. Coop. Wildlife Research Unit, Amherst, Massachusetts. *Comparative Embryonic Condition of Redwinged Blackbird and Other Species at Hatching*, slides.
24. Thomas A. Imhof, Alabama Department of Conservation, Fairfield, Alabama. *New Distributional Information from Alabama*, slides.
25. Maurice Broun, Hawk Mountain Sanctuary, Kempton, Pennsylvania, and John B. Holt, Jr., North Andover, Massachusetts. *Camera Studies of Nesting Hawks and Owls*, slides.
26. Donald J. Borror, Ohio State University, and William W. H. Gunn, Federation of Ontario Naturalists. *Songs of the White-throated Sparrow.*
27. Ben B. Coffey, Jr., Memphis, Tennessee. *Swift Flocks South of the Border.*
28. Harvey I. Fisher, Southern Illinois University. *The Avian Problem on Midway Atoll*, slides.

Attendance

Members and guests who registered totaled 332 persons. Twenty-eight states, plus Ontario, were represented.

From **Alabama**: 7—*Auburn*, Julian L. Dusi; *Birmingham*, Blanche H. Chapman, Blanche E. Dean; *Fairfield*, Thomas A. Imhof; *Gadsden*, Paul A. Stewart; *Huntsville*, Mr. and Mrs. James C. Robinson.

From **Arkansas**: 1—*Fayetteville*, Douglas James.

From **California**: 2—*Pasadena*, Dr. and Mrs. Robert L. Taylor.

From **Florida**: 7—*Daytona Beach*, Mr. and Mrs. C. H. Ekdahl; *Homestead*, Mr. and Mrs. Vernon C. Gilbert, William B. Robertson, Jr.; *Ormond Beach*, Jean M. Hudson, Roy D. Hudson.

From **Georgia**: 39—*Athens*, Herbert W. Kale, II, Eugene P. Odum; *Atlanta*, Orpha P. Baber, Ruth H. Gogel, Lida M. Mackenzie, Mrs. J. C. Oliver, Dr. and Mrs. Richard A. Parks; *Augusta*, J. Fred Denton; *Columbus*, Mr. and Mrs. L. A. Wells; *Dalton*, Hermon King, Maurine King, Mr. and Mrs. Ollie Munn; *Demorest*, Mrs. Charles Neal; *Griffin*, Dolly Brooks; *Macon*, M. Alma Cooke; *Marietta*, Manilla B. Land, Mrs. Marine W. Snow; *Milledgeville*, Katherine Weaver; *Mount Berry*, Alta Stevens; *Naylor*, Clyde E. Connell; *Pine Mountain*, Winslow M. Shaughnessy; *Rome*, Mrs. W. A. DuPre, Mrs. Ligon Henderson, Mrs. Wright King, Louise Nunnally, Virginia Starr; *Sandersville*, Mrs. Elizabeth P. Newsom, William Rawlings, Jr.; *Savannah*, Marjorie E. Canterberry, Mary E. Darby; *Thomaston*, Mrs. S. J. Carswell; *Thomas-*

ville, H. L. Stoddard, Sr.; *Warner Robins*, Mr. and Mrs. Thomas J. Cater, Jr.; *Waycross*, Eugene Cypert, Mrs. Eugene Cypert.

From **Illinois**: 18—*Blue Island*, Karl E. Bartel; *Carbondale*, Harvey I. Fisher, Mrs. Harvey I. Fisher; *Chicago*, Mrs. Amy G. Baldwin, Donna Finucane, Margaret Lehmann, Gerald B. Ryan, Paul A. Schulze; *Cicero*, Marcella Valenta; *DeKalb*, William E. Southern, Jerrold H. Zar; *Evergreen Park*, David Cobb; *Franklin Park*, William R. Stemke; *Lake Bluff*, Mr. and Mrs. Albert J. Zimmermann; *Momence*, Hazel Bradley Lory; *Urbana*, Mrs. Colleen Helgeson Nelson; *Willow Springs*, Floyd Swink.

From **Indiana**: 9—*Connersville*, Edna Banta; *Hanover*, Dan Webster; *Indianapolis*, Charles S. Berriman, III, Robert L. Dilts, Virginia-Rae Dilts, Betty Jean Moore; *Muncie*, Harold Zimmerman, Helen Zimmerman; *West Terre Haute*, Mrs. James H. Mason.

From **Iowa**: 3—*Davenport*, Mrs. Charles I. Hied, Peter Petersen, Jr., Mrs. Peter Petersen.

From **Kansas**: 2—Mr. and Mrs. John William Hardy.

From **Kentucky**: 12—*Anchorage*, Mr. and Mrs. Burt L. Monroe, Sr.; *Bowling Green*, Gordon Wilson; *Henderson*, Mr. and Mrs. William H. Rheade; *Louisville*, Leonard C. Brecher, Mrs. F. W. Stamm; *Madisonville*, James W. Hancock; *Paducah*, Esther Smith; *Princeton*, Cynthia Counce; *Winchester*, Mr. and Mrs. A. H. Mayfield.

From **Louisiana**: 9—*Baton Rouge*, Dr. and Mrs. George Lowery; *New Orleans*, Mrs. Dorothy M. Russell, Stephen M. Russell; *Shreveport*, Mrs. H. C. Hearne, Mrs. Ethel D. Jones, Horace H. Jeter; *Thibodaux*, Mrs. Electa Levi, Ava R. Tabor.

From **Maryland**: 6—*Easton*, Edith D. Adkins, Mrs. Walter S. Galloway, Dorothy Vernon Smith; *Garrett Park*, Clarence L. Buck; *Royal Oak*, Mrs. Catherine Bauer; *Towson*, Margaret Martin.

From **Massachusetts**: 3—*Dover*, Mr. and Mrs. Aaron M. Bagg; *Medford*, Marion Thiesfeldt.

From **Michigan**: 28—*Alma*, Dr. and Mrs. Lester E. Eyer; *Ann Arbor*, Dorothy Blanchard, Mr. and Mrs. Ralph M. Branch; *Battle Creek*, Dr. and Mrs. Lawrence H. Walkinshaw; *Grayling*, Mr. and Mrs. Fenn M. Holden; *Jackson*, Keith Arnold; *Kalamazoo*, Walter A. Ash, H. Lewis Batts, Jr., Jane Bell, Judith A. Centa, Eva Mae Eicher, Nancy Ericson, Monica Evans, Mary Ann Kahl, David Larson, Bob McLean, Mary Murch; *Lansing*, Mr. and Mrs. W. R. Freeman; *Leonard*, Mrs. Don S. Miller; *Marquette*, Mrs. Mary Spear Ross; *Midland*, Richard Koerker; *Mt. Pleasant*, Irene F. Jorae, JoAnn Coleman.

From **Minnesota**: 2—*Collegeville*, Edmund A. Hibbard; *Duluth*, P. B. Hofslund.

From **Mississippi**: 4—*Biloxi*, Dr. Carl B. De Forest; Vivian C. De Forest; *Crystal Springs*, Fannye A. Cook, Mai Brown.

From **North Carolina**: 1—*Winston-Salem*, David W. Johnston.

From **New Jersey**: 16—*Audubon*, Clarence E. Stasz; *Bound Brook*, Bertram G. Murray, Jr.; *Caldwell*, Kenneth Crowell; *Jamesburg*, Jeff Swinebroad; *Mountainside*, Mr. and Mrs. Albert Schnitzer; *New Brunswick*, Thomas C. Crebbs, R. Alan Lewis; *Orange*, Mrs. W. A. Wachenfeld; *Pompton Plains*, Mr. and Mrs. Frank P. Townsend; *Ramsey*, Mrs. J. Y. Dater; *Spotswood*, Mr. and Mrs. Stanley S. Dickerson; *Upper Montclair*, Mr. and Mrs. Frank P. Frazier.

From **New York**: 12—*Bronx*, Eva Sobol; *Brooklyn*, Peter C. Wolcott; *Buffalo*, Mr. and Mrs. Edward C. Ulrich; *Jacksonville*, Mr. and Mrs. Alfred T. Graham; *Jamestown*, O. G. Burgeson; *Mamaroneck*, Robert S. Arbib, Jr.; *New York City*, John K. Terres; *Niagara Falls*, Stuart Whitmire; *Williamsville*, Mr. and Mrs. Harold D. Mitchell.

From **Ohio**: 10—*Ashtabula*, Howard E. Blakeslee; *Cleveland*, Mildred Stewart; *Columbus*, Dr. and Mrs. Donald J. Borror; *Delaware*, Mr. and Mrs. William D. Stull; *Lakewood*, Mr. and Mrs. William A. Klamm; *Waterville*, Mr. and Mrs. Harold Mayfield.

From **Oklahoma**: 4—*Muskogee*, Forrest Bebb, Mr. and Mrs. M. R. Bebb, Mary P. Bebb.

From **Pennsylvania**: 18—*Beaver*, W. E. Clyde Todd; *Bethlehem*, Mr. and Mrs. Richard J. Kent; *Chester Springs*, Mr. and Mrs. Phillips B. Street; *Kempton*, Mr. and Mrs. Maurice Broun; *Lancaster*, K. B. Corbett; *Lock Haven*, George E. Grube; *Philadelphia*, Frederick V. Hebard, Daniel L. Hebard; *Pittsburgh*, Kenneth C. Parkes; *State College*, Earl R. Bordner, Mrs. Earl R. Bordner, Dorothy L. Bordner, Charles H. Trost; *University Park*, Mr. and Mrs. Merrill Wood.

From **Rhode Island**: 2—*Middletown*, James Baird; *Jamestown*, Mrs. Allan G. Davenport.

From **South Carolina**: 4—*Greenville*, Mr. and Mrs. George F. Townes; *Travelers Rest*, M. Ruth Gilreath, Lillie Hart.

From **Tennessee**: 90—*Chattanooga*, Mr. and Mrs. T. Stanley Barr, Ralph T. Bullard, Jr., Edith Fenn, Mabel Norman, Mr. and Mrs. Henry Sliger, Virginia Sliger, Mary Tunsberg, Mr. and Mrs. E. M. West; *Cookeville*, Beulah Clark, Mr. and Mrs. Ralph L. Dunckel, Caprice Haile; *Elizabethton*, Kenneth H. Dubke, Mr. and Mrs. Lee R. Herndon, Frank Ward; *Fountain City*, Bill Pardue, Martha Pardue, Pat Pardue, Paul Pardue, Tom Pardue; *Gatlinburg*, Elsie Janson, Mrs. Nelson B. Rue, Mr. and Mrs. Arthur Stupka; *Greeneville*, Mr. and Mrs. Richard Nevius, Helen K. White; *Jackson*, John A. Cheek, II; *Kingsport*, James Finucane, Joseph Finucane, Thomas Finucane; *Knoxville*, Tee Brichetto, Jessie Dempster, John Elson, Mary Enloe, Mr. and Mrs. Harold S. Garlinghouse, David Highbaugh, Joseph C. Howell, Mrs. Joseph C. Howell, Mr. and Mrs. William Johnson, Mr. and Mrs. J. T. Mengel, Mr. and Mrs. R. A. Monroe, J. B. Owen, Mrs. E. E. Overton, Mrs. Thomas Swindell, James T. Tanner, Doris Thomson, Mr. and Mrs. Samuel R. Tipton, Mr. and Mrs. George R. Wood; *Lebanon*, Martha Campbell, Dixon Merritt, Ruth Merritt; *Maryville*, Ralph Zaenglein; *Memphis*, Mr. and Mrs. Ben B. Coffey, Jr., Mary Davant, Mr. and Mrs. Henry A. Schiller, Alice Smith, Mrs. Arlo I. Smith; *Nashville*, Dr. and Mrs. O. C. Ault, Charles E. Farrell, Mary W. Frazer, Albert F. Ganier, Will Hon, John Ogden, Mr. and Mrs. Gene Ruhr; *Newport*, John N. Pattison; *Norris*, Mrs. Earl F. Olson; *Oak Ridge*, Lois Barclay, Mr. and Mrs. Robert J. Dunbar, Julia I. Moore; *Powell*, William F. Gallagher; *Smokie Heights*, Mr. and Mrs. W. Glynn Roehr; *Ten Mile*, Mrs. James Hlaunicka; *Williamsport*, Mrs. Katherine A. Goodpasture.

From **Virginia**: 7—*Bristol*, E. H. Dickey, Mr. and Mrs. H. M. Crosley; *Norfolk*, Mrs. Floy Burford, Mrs. J. D. Gregory, Mr. and Mrs. Jack P. Hailman.

From **West Virginia**: 5—*Huntington*, R. van Blaricom; Morgantown, Mr. and Mrs. Maurice Brooks, George R. Maxwell, II, Earl N. McCue.

From **Wisconsin**: 2—*Madison*, Judy Cooper; *West Bend*, Marvin E. Vore.

From **Wyoming**: 1—*Casper*, Mrs. Lucy Rongstald.

From **Ontario**: 2—*Pickering*, J. Murray Speirs; *Toronto*, William W. H. Gunn.

No Address: 6—Earl Bishop, Keith Blackmore, Ruth Castles, Mrs. J. H. McWhorter, Katheryn Paullus, Dan Schreiber.

THE WILSON ORNITHOLOGICAL SOCIETY

Officers, 1960

President	Harold F. Mayfield
First Vice-President	Phillips B. Street
Second Vice-President	Roger Tory Peterson
Secretary	Aaron M. Bagg
Treasurer	Merrill Wood
Editor	H. Lewis Batts, Jr.

Additional Members of the Executive Council

Elective Members

Ernest P. Edwards — Ralph M. Edeburn — Harvey I. Fisher

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Reuben M. Strong
Albert F. Ganier
Margaret M. Nice
Jesse M. Shaver
George M. Sutton
S. Charles Kendeigh
Olin S. Pettingill, Jr.
Maurice G. Brooks
Walter J. Breckenridge
Burt L. Monroe
John T. Emlen, Jr.
Lawrence H. Walkinshaw

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Phillips B. Street — Leonard C. Brecher — Paul J. Nowland

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Ornithological Literature Editor

Olin Sewall Pettingill, Jr.

Chairmen of Committees

Annual Meeting	Mrs. Robert A. Monroe
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Conservation	Thomas G. Scott
Endowment	Richard Zusi
Library	William A. Lunk
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Nominating	Olin Sewall Pettingill, Jr.
Publications	Harrison Tordoff
Research	Harvey I. Fisher

MEMBERSHIP ROLL*

PATRONS

Carnes, Mrs. Herbert A., 31 Dogwood Lane, Tenafly, New Jersey 1944
Peterson, Roger Tory, Neck Rd., Old Lyme, Connecticut 1942
Strong, R. M., 5716 Stony Island Ave., Chicago 37, Illinois ..... Founder
Van Tyne, Josselyn ..... Deceased

†Life Member *Sustaining Member Others—Active Members

Abbott, Jackson Miles, 1100 Doter Dr., Waynewood, Alexandria, Virginia 1948
Abraitys, Vincent, Sergeantsville, New Jersey 1956
Ackermann, Fred J., 1298 Edanola Ave., Lakewood 7, Ohio 1956
Adams, C(lyde) Bruce, 40 Summit Rd., Riverside, Connecticut 1959
Adams, Heman P(urdy), 218 Main St., Glenville, West Virginia 1959
Adams, William Hensley, Jr., Route 2, Madisonville, Tennessee 1951
*Adelson, Richard Henry, Remsen's Lane, RD 1, Oyster Bay, L.I., New York 1938
*Afsprung, Arthur E., 3308 Bishop St., Cincinnati 20, Ohio 1948
Agey, H. Norton, 908 Avenue H, N.E., Winter Haven, Florida 1960
Ahlquist, Jon Edward, 2014 West 16 St., Ashtabula, Ohio 1959
Aiken, Carl Howard, 3767 Georgetown, Houston 5, Texas 1959
*Aldrich, John Warren, 7725 Lakeview Dr., Falls Church, Virginia 1930
*Alexander, Donald C(hild), 16 Pleasant St., Nahant, Massachusetts 1937
Alexander, Gordon, Dept. of Biology, University of Colorado, Boulder, Colorado 1936
Allen, Arthur A(ugustus), Fernow Hall, Cornell University, Ithaca, New York 1914
Allen, Arthur W(esley), 561 Eastern Blvd., Watertown, New York 1959
Allen, Robert P(orter), Box 205, Tavernier, Florida 1947
Allen, Ted T(ipton), Dept. of Biology, Flint Hall, University of Florida, Gainesville, Florida 1958
*Allin, A(lbert) E(llis), Provincial Laboratory, Fort William, Ontario, Canada 1943
Allyn, (Paul) Richard, 709 Myers Building, Springfield, Illinois 1944
Almon, Lois, 2639 N. 14th St., Milwaukee 6, Wisconsin 1958
Alperin, Irwin M., 187 Cedar Lane, Babylon, New York 1939
Altemus, Edward Lee, Lafayette Ave., Fort Washington, Pennsylvania 1954
Altsheler, Mrs. Yancey R(oberts), 2412 Dundee Rd., Louisville 5, Kentucky 1954
Amadon, Dean, American Museum of Natural History, Central Park West at 79th St., New York 24, New York 1935
Ammon, Walter L., 2607 Kessler, Midland, Texas 1958
Anaka, William, Sprit Lake, Saskatchewan, Canada 1957
Anderson, Anders H(arold), 3221 E. Kleindale Rd., Tucson, Arizona 1937
Anderson, Frank G., Dept. of Sociology, University of Maryland, College Park, Maryland 1951
Anderson, John M., R.R. 4, Winous Point Club, Port Clinton, Ohio 1938
†Annan, Ormsby, 715 Red Cedar Rd., Okemos, Michigan 1956
Anthes, Clarence A(lvin), 707 N. Moreland Blvd., Waukesha, Wisconsin 1939
Arbib, Robert S(imeon), Jr., 128 Lawn Terrace, Mamaroneck, New York 1947
Armington, Sven, Blanchegatan 18, Stockholm No., Sweden 1948
Armstrong, Edward T., 550 Avenue E, Bayonne, New Jersey 1960
*Armstrong, Virginia, Old Concord Rd., South Lincoln, Massachusetts 1939
Arnold, Elting, 4914 Dorset Ave., Chevy Chase 15, Maryland 1941
Arnold, Keith A(lan), 826 Steward Ave., Jackson, Michigan 1960
Arny, Samuel A., 7432 Hamlet St., Springfield, Virginia 1947
†Aronoff, Arthur Edward, Dept. of Zoology, University of Michigan, Ann Arbor, Michigan 1948
Ashton, Randolph, 800 Crown St., Morrisville, Pennsylvania 1941
*Atkeson, Thomas Zephaniah, P.O. Box 1643, Decatur, Alabama 1953
Austin, Mrs. Harold C., 1116 Mandana Rd., Oakland 10, California 1950
Austin, Oliver L(uther), Jr., Florida State Museum, Gainesville, Florida 1930
*Avent, Carrie Pillow, Minter City, Mississippi 1959
Axtell, Harold H., Buffalo Museum of Science, Humboldt Park, Buffalo 11, New York 1950

* Correct to June 7, 1960

Babcock, Charles D., 36th St. and Woodland Ave., Reading, Pennsylvania 1959
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Baepler, Donald H., Div. of Science & Mathematics, Central Washington College of Education, Ellensburg, Washington 1955
†Bagg, Aaron Moore, Farm Street, Dover, Massachusetts 1948
Bailey, Alfred Marshall, Museum of Natural History, City Park, Denver 6, Colorado 1928
*Bailey, Harold H(arris), Rockridge Alum Springs Biological Laboratory, Route 2, Goshen, Virginia 1908
Bailey, W. Wallace, Wellfleet Bay Wildlife Sanctuary, Box 171, South Wellfleet, Massachusetts 1959
Baillie, James Little, Royal Ontario Museum, Queens' Park at Bloor, Toronto 5, Ontario, Canada 1939
Baird, James, Norman Bird Sanctuary, Third Beach Road, Middletown, Rhode Island 1954
†Baker, Bernard W., R.D. 1, Judson Rd., Spring Lake, Michigan 1938
Baker, Mrs. H. A., R.R. 1, New Castle, Indiana 1960
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Baker, Paul S(eaman), 21 Woodlot Lane, Huntington, L.I., New York 1946
Baker, Rollin Harold, The Museum, Michigan State University, East Lansing, Michigan 1938
Baker, William C(alvin), 559 Euclid St., Salem, Ohio 1931
Baldwin, Mrs. Amy G., 6335 Kimbark Ave., Chicago 37, Illinois 1943
Baldwin, Paul H., Dept. of Zoology, Colorado State University, Fort Collins, Colorado 1956
Baldwin, William Grove, 601 Douglas, Box 1627, Wenatchee, Washington 1959
Ball, Kathleen E., 11719 - 133rd St., Edmonton, Alberta, Canada 1946
Balsom, Mrs. Amos Parker, 2209 E. Stratford Court, Milwaukee 11, Wisconsin 1949
Banks, Clinton S(eeger), 202 Wilma Ave., Steubenville, Ohio 1945
Banks, Richard C(harles), Museum of Vertebrate Zoology, Berkeley 4, California 1959
Banta, Edna, Mary Gray Bird Sanctuary, Route 6, Connersville, Indiana 1945
*Barbour, Llewellyn P(helps), 4780 Wood St., Willoughby, Ohio 1948
Bard, Fred George, Museum of Natural History, Albert St. and College Ave., Regina, Saskatchewan, Canada 1946
Barlow, Jon Charles, Dept. of Zoology, University of Kansas, Lawrence, Kansas .. 1959
†Bartel, Karl E(mil) Edgar, 2528 West Collins St., Blue Island, Illinois 1934
Barth, R. H., Jr., Biological Laboratories, Harvard University, Cambridge 38, Massachusetts 1957
Bartleson, Fred D(urant), Jr., U.S. Air Force Academy, Colorado 1952
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Bartlett, L(awrence) M(atthews), Dept. of Zoology, University of Massachusetts, Amherst, Massachusetts 1957
Bartlett, Wesley H., 122 South Ridgley, Algona, Iowa 1936
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Bastin, Eric W(alter), 43 Inglewood Dr., Apt. 2, Hamilton, Ontario, Canada 1951
Batchelder, Edgar M(arden), 56 Orchard St., Marblehead, Massachusetts 1941
*Bates, Rex J(ames), 108 Willow St., Park Forest, Illinois 1960
†Batts, H(enry) Lewis, Jr., 2315 Angling Rd., Kalamazoo, Michigan 1946
Batts, H(enry) Lewis, Sr., Mercer University, Macon, Georgia 1959
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Baylor, L(eslie) M(ilton), 1302 South Fourth Ave., Pocatello, Idaho 1954
Beardsley, M(argaret) Hortense, 330 N. Chestnut St., Ravenna, Ohio 1941
Bebb, Forrest, 1300 Boston Ave., Muskogee, Oklahoma 1955
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Beddall, Mrs. Barbara G(ould), 2502 Bronson Rd., Fairfield, Connecticut 1958
Beecher, William J(ohn), Chicago Academy of Sciences, 2001 N. Clark St., Chicago 14, Illinois 1948
Beer, James R(obert), Dept. of Entomology and Econ. Zoology, University of Minnesota, St. Paul 1, Minnesota 1957
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Behrens, Harry Carl, Box 1055, Rapid City, South Dakota 1950
†Belcher, Paul Eugene, 230 Mineola Ave., Akron 13, Ohio 1938
Belknap, John B(alcom), 92 Clinton St., Gouverneur, New York 1959
*Bell, Henry III, U.S. Geol. Surv., Agri. Research Center, Beltsville, Maryland 1946
Bell, Miriam, Toledo State Hospital, Toledo 3, Ohio 1958
Bellrose, Frank, Jr., Illinois Natural History Survey, Havana, Illinois 1935
Bender, Charles R(ichard), 364 Alex Hamilton, San Antonio 1, Texas 1960
*Bender, R. O., Coble's Mill Rd., Bridgeton, New Jersey 1957
Bennett, A. F., 800 South Minick, Denison, Texas 1955
Bennett, Esther (Vorena), S.I.U. Museum, Carbondale, Illinois 1954
Bennett, Holly Reed, 2457 Orchard St., Chicago 14, Illinois 1949
Benson, Seth Bertram, 645 Coventry Rd., Berkeley 7, California 1930
Bent, Mrs. M. V., 275 Monroe Ave., Rochester, New York 1955
Benton, Allen H(aydon), Dept. of Biology, New York State College for Teachers, Albany, New York 1953
†Berger, Andrew J(ohn), Dept. of Anatomy, University of Michigan, Ann Arbor, Michigan 1940
Berger, Daniel D(avid), 510 E. MacArthur Rd., Milwaukee 17, Wisconsin 1953
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Berrett, Delwyn Green, Museum of Zoology, Louisiana State University, Baton Rouge 3, Louisiana 1959
Betts, Amelia J(eannette), Baldwin City, Kansas 1953
Betts, Mrs. Charles E., 1065 Madison Ave., Albany 8, New York 1959
Biaggi, Virgilio, Jr., College of Agriculture, Mayaguez, Puerto Rico 1945
Bibbee, P. C., Concord College, Athens, West Virginia 1958
Biddle, E. Turner, Leiters Ford, Indiana 1960
Binford, L(aurie) C(harles), Museum of Zoology, Louisiana State University, Baton Rouge 3, Louisiana 1954
Birch, Robert Lee, Dept. of Biology, West Virginia University, Morgantown, West Virginia 1950
Birkenholz, Dale E(ugene), Dept. of Biology, University of Florida, Gainesville, Florida 1957
Black, Charles T(heodore), Route 1, Box 480, East Lansing, Michigan 1935
Blake, Charles H(enry), P.O. Box 613, Hillsboro, North Carolina 1950
Blake, Mrs. Grace S., 1933 Westwood Dr., Topeka, Kansas 1950
Blakeslee, Howard E., 1722 East 45th St., Ashtabula, Ohio 1959
Blanchard, Harold H(ooper), 32 Calumet Rd., Winchester, Massachusetts 1946
Blanchet, Helen, 1406 Southfield Rd., Lincoln Park, Michigan 1954
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Bock, Walter (Joseph), 7630-85 Drive, Woodhaven 21, New York 1953
Bodsworth, Fred, 294 Beech Ave., Toronto 8, Ontario, Canada 1956
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Bond, Richard R(andolph), Elmira College, Elmira, New York 1955
Bondi, Joseph, 355 Hutchinson Blvd., Mt. Vernon, New York 1960
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Bordner, Dorothy L., 926 W. Beaver Ave., State College, Pennsylvania 1959
Borell, Adrey Edwin, Soil Conservation Service, Building 50, Federal Center, Denver 25, Colorado 1936
Borror, Donald J(oyce), Dept. of Zoology and Entomology, Ohio State University, Columbus 10, Ohio 1927
Boughner, W. C., Claire Drive, R.D. 2, Somerville, New Jersey 1956
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Bower, Mrs. F. L., R.F.D. 1, Lee's Hill Rd., Basking Ridge, New Jersey 1954

Boyd, Elizabeth M(argaret), Mount Holyoke College, South Hadley, Massachusetts 1941
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Boyer, G(ertrude) Paula, 420 E. 2nd Ave., Roselle, New Jersey 1953
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Brady, Alan, RD 1, Bridgetown Pike, Langhorne, Pennsylvania 1959
*Branch, Mrs. Margaret G(amble), 1324 Wells St., Ann Arbor, Michigan 1952
Brandes, K(enneth) W(illiam), 51 Stevens St., Wellsville, New York 1959
Brandt, John Henry, Tr. Terr. of Pacific Islands, Truk, E. Caroline Islands (via Guam) 1958
Branum, Florence (Pauline), 117 N. Ewing St., Lancaster, Ohio 1946
Brauner, Joseph, 3855 Potomac Ave., Los Angeles 8, California 1942
Braunscheig, Mrs. Lee W(elsh), 712 E. Montgomery Ave., North Wales, Pennsylvania 1953
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Breiding, George H(erbert), Oglebay Institute, Wheeling, West Virginia 1942
Brewer, Richard Dean, Dept. of Biology, Western Michigan University, Kalamazoo, Michigan 1949
Brigham, Edward M(orris), Jr., Kingman Memorial Museum, Battle Creek, Michigan 1931
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Broadbrooks, Harold E(ugene), Southern Illinois University, Alton Residence Center, Alton, Illinois 1948
Brodkorb, Pierce, Dept. of Biology, University of Florida, Gainesville, Florida 1951
Brody, Gerald L(ee), Dept. of Pathology, University of Michigan Medical Center, Ann Arbor, Michigan 1954
Brooke, Mrs. Margaret, 126-51st St., Des Moines 12, Iowa 1958
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Broun, Maurice, Route 2, Kempton, Pennsylvania 1935
Brown, Jerram L., Museum of Vertebrate Zoology, Life Science Bldg., Berkeley 4, California 1950
Brown, John Warner, Oatka Farm, Scottsville, New York 1959
†Brown, Lawrence A(llyn), Jr., 434 Marlborough St., Boston 15, Massachusetts 1958
Brown, N(orman) Rae, Faculty of Forestry, University of New Brunswick, Fredericton, New Brunswick, Canada 1945
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Brueggemann, Anna L(ouise), 584 Sheridan Ave., Columbus 9, Ohio 1943
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Bryan, Burton Donald, 162 French St., Fall River, Massachusetts 1949
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Buck, Mrs. J(ohn) P(aul), R.R. 1, Box 332, Hamlet, Indiana 1960
Buckland, George (Henry) (Edward), Box 343, Route 1, Batavia, New York 1949
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Bullard, Ralph T., Jr., 5427 Slayton Ave., Chattanooga 10, Tennessee 1960
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Bures, Joseph August, Route 1, West Newton, Pennsylvania 1946
Burner, Florence H(elen), 1336 Crofton Rd., Baltimore 12, Maryland 1948
Burnham, Gladys L(ou), Dept. of Biology, Clarendon Jr. College, Clarendon, Texas 1954
Burns, Robert David, Dept. of Zoology, University of Oklahoma, Norman, Oklahoma 1948
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Burt, William Henry, Museum of Zoology, University of Michigan, Ann Arbor, Michigan 1928

Burton, Donald E(rnest), 171 Stratearn Rd., Toronto 10, Ontario, Canada 1953
Burtt, Benjamin P., 109 Haffenden Rd., Syracuse 10, New York 1956
Burtt, Harold E., 2163 N. Starr Ave., Columbus 21, Ohio 1953
Bushman, John, Ecological Research, University of Utah, Dugway, Utah 1951
*Butsch, Robert Sterns, Exhibit Museum, University of Michigan, Ann Arbor, Michigan 1947
Byers, Mrs. Esther, 2905 San Rafael, Tampa, Florida 1951
Cade, Tom, Dept. of Zoology, Syracuse University, Syracuse 10, New York 1950
Cahalane, Victor H(arrison), 80 Fernbank Ave., Delmar, New York 1933
Calef, Robert, Bay City Junior College, Bay City, Michigan 1954
Calvert, Earl Wellington, RR 2, County Home, Lindsay, Ontario, Canada 1937
Calvin, Robert L(eal), RD 3, Pulaski Rd., New Castle, Pennsylvania 1951
Camp, Mrs. Dorothy I(rene), RD 1, Stuart Lake, Marshall, Michigan 1957
Campbell, Louis W(alker), 4531 Walker Ave., Toledo 12, Ohio 1926
Campbell, Mildred F(lorence), 29 N. Hawthorne Lane, Indianapolis 19, Indiana 1938
Cansfield, William Buck, Clear Lake School Camp, Dowling, Michigan 1958
Cantwell, Mrs. L. R. (Ida), R.D. 2, Mattoon, Illinois 1959
Cardinali, Mrs. Lillian E., Jolian Farm, RD 2, Box 460, Jamesburg, New Jersey 1958
Carl, Harry G., 2304 Davie St., Davenport, Iowa 1949
Carpenter, Charles C., Dept. of Zoology, University of Oklahoma, Norman, Oklahoma 1951
Carpenter, Floyd S., 2402 Longest Ave., Louisville 4, Kentucky 1934
Carrick, W(illiam) H(enesey), R.R. 2, Uxbridge, Ontario, Canada 1960
Carroll, Robert P., Dept. of Biology, Virginia Military Institute, Lexington, Virginia 1942
†Carrothers, Vera, 14704 Alder Ave., East Cleveland 12, Ohio 1938
Carson, L(enwood) B(allard), 1306 Lincoln St., Topeka, Kansas 1948
Carter, Charles E(dward), 1339-30th St., Orlando, Florida 1958
Carter, Dennis (Lee), Wildlife Research Center, Denver Federal Center Bldg. 45, Denver 25, Colorado 1947
*Carter, Mrs. E. W., Route 2, Perrysburg, Ohio 1946
†Cartwright, Bertram William, c/o Ducks Unlimited (Canada), 201 Bank of Commerce Bldg., Winnipeg, Manitoba, Canada 1930
Cassel, J(oseph) Frank(lin), Dept. of Zoology, North Dakota Agricultural College, Fargo, North Dakota 1940
Castles, Ruth Palmer, 2600-21st Ave., South, Forrest Hills Apt. B-7, Nashville 12, Tennessee 1960
Caswell, Herbert H(all), 223 North Summit St., Ypsilanti, Michigan 1959
Cater, Milan B(rison), P.O. Box 1262, Lynchburg, Virginia 1944
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Chamberlaine, Lee B., 145 Dorwin Ave., Syracuse 5, New York 1957
Chambers, Glenn D., 110 Stephens Hall, Wildlife Bldg., University of Missouri, Columbia, Missouri 1959
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Chaniot, George E., Jr., 1069 West Prairie, Decatur, Illinois 1956
Chapelle, Francis O(berlin), Quarters 15, West Point, New York 1954
Chapin, James P(aul), American Museum of Natural History, Central Park West at 79th St., New York 24, New York 1945
Chapman, Blanche Hammond, 1325 S. 19th St., Birmingham, Alabama 1953
Chapman, Herman Floraine, 712 South Dakota Ave., Sioux Falls, South Dakota 1947
Chapman, Lawrence B., R.F.D. Box 90, Hubbardston, Massachusetts 1940
Chase, Charles Greenough, Mere Place, R.D., Brunswich, Maine 1959
Chase, Theodore, Jr., Farm Street, Dover, Massachusetts 1960
Chell, Thomas Ross, 69 Hansen Dr., Bourbonnais, Illinois 1952
Chinery, D. J., 119 Kingsmead Ave., Worcester Park, Surrey, England 1959
Choate, Ernest A., 411 Rodman Ave., Jenkintown, Pennsylvania 1954
Chutter, Mildred C., Box 229, Athens, Ohio 1936
Clark, Mrs. Ben P., 2736 Hilltop Circle, Gadsden, Alabama 1952
Clark, George A(lfred), Jr., Peabody Museum of Natural History, Yale University, New Haven, Connecticut 1955
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Clement, Roland C(harles), 18 Senga Rd., South Norwalk, Connecticut 1941
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†Coffey, Ben Barry, Jr., 672 N. Belvedere, Memphis 7, Tennessee 1927
Coffey, Mrs. Lula C(ooper), 672 N. Belvedere, Memphis 7, Tennessee 1952
Coggeshall, Robert D., Billington Rd., East Aurora, New York 1956
Cogswell, Howard L(yman), Dept. of Biological Sciences, Mills College, Oakland 13, California 1944
Cole, Mrs. Richard D., 625 Valley Lane, Towson 4, Maryland 1955
Cole, Mrs. Whiteford R., Jr., 1746 Sulgrave Rd., Louisville 5, Kentucky 1956
Collier, Gerald, Dept. of Zoology, University of California, Los Angeles 24, California 1956
Collins, Charles T(hompson), 337 West End Rd., South Orange, New Jersey 1959
Collins, Henry H., Jr., 1200 Post Rd., Scarsdale, New York 1952
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Confer, John L(eonard), Earlham College, Box 423, Richmond, Indiana 1960
Conkey, John H., 11 Chestnut St., Ware, Massachusetts 1947
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Conrad, Charles L(ouis), 137 N. 11th St., Wheeling, West Virginia 1937
Conway, William G., New York Zoological Park, 185th St. and Southern Blvd., New York 60, New York 1959
Cook, Fannye A(dine), 270 East Georgetown, Crystal Springs, Mississippi 1923
Cooke, Thomas Turner, 71 MacCulloch Ave., Morristown, New Jersey 1959
Coombes, Robert Armitage Hamilton, The Zoological Museum, Tring, Hertfordshire, England 1936
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Cox, George W., Vivarium Bldg., Wright and Healy Sts., Champaign, Illinois 1954
Coy, Roy E., St. Joseph Museum, St. Joseph, Missouri 1953
Crawford, Alan, Jr., White Horse Rd., Devon, Pennsylvania 1949
Creager, Joe C(lyde), L.A. Cann Rd., Drawer 1267, Ponca City, Oklahoma 1947
Crichton, Vincent, Chapleau, Ontario, Canada 1948
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Croft, Joseph E., 2366 Gladstone Ave., Louisville 5, Kentucky 1956
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Cruickshank, Allan Dudley, 1925 Indian River Dr., Rockledge, Florida 1939
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Cunningham, Richard L(ynn), 72 N.W. 33 Ave., Miami 35, Florida 1953
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Cuthbert, Nicholas L., Dept. of Biology, Central Michigan University, Mt. Pleasant, Michigan 1950
Cutler, Mrs. Betsey D., 2128 Great Highway, San Francisco 16, California 1959
Dana, Edward Fox, 57 Exchange St., Portland 3, Maine 1939

Dane, Benjamin, Dept. of Biology, Cornell University, Ithaca, New York 1957
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Daniels, Estrilla (Myrtle), 270 S. Prospect St., Ravenna, Ohio 1959
Daniels, Mildred, 21925 McCauley Rd., Cleveland 22, Ohio 1959
Darby, Richard T(horn), Prospect St., Sherborn, Massachusetts 1948
*Darden, Mrs. Colgate W(hitehead), Jr., Flicker Pt., Algonquin Park, Norfolk 5, Virginia 1943
Dater, Mrs. John Y., 259 Grove St., Ramsey, New Jersey 1949
Davant, Mary, 861 N. McLean Blvd., Memphis 7, Tennessee 1952
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Davey, Winthrop N(ewbury), 495 Hillspur Rd., Ann Arbor, Michigan 1941
Davidson, Mrs. W. F., 332 Summit Ave., St. Paul 2, Minnesota 1953
Davidson, William Mark, 1504 Bodell St., Orlando, Florida 1933
Davis, Clifford Vernon, Dept. of Zoology and Entomology, Montana State College, Bozeman, Montana 1945
Davis, David E(dward), Dept. of Zoology and Entomology, The Pennsylvania State University, University Park, Pennsylvania 1940
Davis, Jane S(trahan), Route 1, Box 497, Kalamazoo, Michigan 1948
Davis, John, Hastings Natural History Reservation, Carmel Valley, California 1939
Davis, L(ouie) Irby, Box 988, Harlingen, Texas 1933
†Davis, W(illiam) B., Dept. of Wildlife Management, College Station, Texas 1938
Davis, William Franklin, 423 W. 46th St., Ashtabula, Ohio 1947
Davis, W. Marvin, Faculty Exchange, University of Oklahoma, Norman, Oklahoma 1956
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Davy, Roger H(ewson), 5547 N. 13th Ave., Phoenix, Arizona 1957
Dawn, Walter H(enry), 176 Wentworth St., Charleston, South Carolina 1945
Dean, Mrs. Blanche Evans, 2100 - 20th Ave., South, Birmingham 9, Alabama 1947
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Deck, Robert Eugene, R.D. 1, Mechanicsburg, Pennsylvania 1959
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Degenhardt, Mrs. Paula Braden, Dept. of Biology, A. & M. College, College Station, Texas 1953
DeGroot, Dudley Sargent, Athletic Branch, S.A.D., USAREUR, APO 245, c/o Postmaster, New York, New York 1948
Dehner, Eugene W(illiam), St. Benedict's College, Atchison, Kansas 1944
†Delacour, Jean Theodore, Los Angeles County Museum, Exposition Park, Los Angeles 7, California 1944
Dempster, Rulon T., 1027 Edgmont Ave., Chester, Pennsylvania 1959
Denham, Reginald (Francis), 100 Central Park, South, New York 19, New York 1948
Denton, J(ames) Fred, 1510 Pendleton Rd., Augusta, Georgia 1935
de Schauensee, Rodolphe Meyer, Devon, Pennsylvania 1945
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*Devlin, Joseph M(ark), 218 S. 43rd St., Philadelphia 4, Pennsylvania 1953
Dexter, Ralph W., Dept. of Biology, Kent State University, Kent, Ohio 1958
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Dickerman, Robert W(illiam), Museum of Natural History, University of Minnesota, Minneapolis, Minnesota 1955
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Dickinson, J(oshua) C(lifton), Dept. of Biology, University of Florida, Gainesville, Florida 1939
Dilger, William C., Laboratory of Ornithology, Cornell University, Ithaca, New York 1957
Dilts, Robert L., 5702 E. 38th St., Indianapolis 26, Indiana 1960
Dingle, Edward von Siebold, Huger, South Carolina 1921
Dixon, J(ames) B(enjamin), 2266 Cranston Dr., Escondido, California 1936
Dixon, Keith Lee, Dept. of Zoology, Utah State University, Logan, Utah 1946
†Doering, Hubert R., 242 E. Walton Pl., Chicago 11, Illinois 1945
Dogger, James R., Dept. of Entomology, North Dakota Agricultural College, Fargo, North Dakota 1954

Domm, Lincoln V(alentine), Dept. of Anatomy, Stritch School of Medicine, Loyola University, 706 S. Wolcott Ave., Chicago 12, Illinois 1936
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Dorsey, George A., Darlington School, Rome, Georgia 1956
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Duffield, Mrs. John W., 1472 Eskridge Way, Olympia, Washington 1948
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This will be the first annual meeting of the Society held in Canada.